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DEPARTMENT OF THE ARMY FIELD MANUAL

ENGINEER BATTALIONS AIRBORNE AND AIRMOBILE DIVISIONS

HEADQUARTERS, DEPARTMENT OF THE ARMY
JUNE 1967

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DEPARTMENT OF THE ARMY
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ENGINEER BATTALIONS, AIRBORNE AND AIRMOBILE DIVISIONS

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*This manual supersedes FM 5–136, 12 July 1966.

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PART ONE

INTRODUCTION

CHAPTER 1

GENERAL

1–1. Purpose

This manual is a guide for the battalion commander, his staff, company commanders, platoon leaders, platoon sergeants, and squad leaders in the organization and employment of the engineer battalions organic to the airborne and airmobile divisions.

1–2. Scope

a. This manual covers the organization, missions, capabilities, employment, and operations of the airborne and airmobile divisions, engineer battalions. Since the missions, employment, and operations, in other than airborne and airmobile operations, are similar to those of other divisional engineer battalions, this manual should be used in conjunction with FM 5–135 for complete coverage of other type operations. Appendix B provides information on airlanding facilities.

b. The discussions of missions, organization, personnel, and equipment are based on the latest issues of tables of organization and equipment (TOE) available at the time of writing. All references to TOE list only the basic numbers. Department of the Army Pam 310–3 should be consulted for latest letter suffixes to the basic numbers.

c. Unless otherwise specified the material presented herein is applicable without modification to both limited and general war, either nuclear or nonnuclear, and to cold war and internal defense operations.

1–3. Recommended Changes

Users of this manual are encouraged to submit recommended changes or comments to improve it. Comments should be keyed to the specific page, paragraph, and line of the text in which change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commanding Officer, U.S. Army Combat Developments Command Engineer Agency, Fort Belvoir, Va. 22060.

PART TWO

ENGINEER BATTALION, AIRBORNE DIVISION

CHAPTER 2

INTRODUCTION

Section I. THE AIRBORNE DIVISION

2–1. Mission

The primary mission of the airborne division is the destruction of enemy military forces and the seizure or domination of critical land areas, their populations, and resources. In addition to its basic mission the division may be employed in internal defense operations.

2–2. Organization

The airborne division (fig. 2–1) consists of a relatively fixed command, staff, combat support, and combat service support structure to which are assigned a number of maneuver battalions (airborne infantry). The division commander, in organizing the division for combat, groups appropriate elements of the division under its three brigade and other control headquarters in types and numbers appropriate to each control unit's specific mission.

2–3. Capabilities and Limitations

a. The organization of the airborne division provides a capability for—

(1) Airborne operations alone or as part of a joint force, including assault by parachute or airlanding.

(2) Ground operations in difficult terrain.

(3) Operations in enemy rear areas for limited periods of time.

(4) Combat as part of a larger force in a non-airborne or non-airlanded operation.

(5) Rapid strategic deployment by air.

(6) Operations under austere maintenance and supply support.

b. The airborne division has the following limitations:

(1) Requirement for considerable initial and continuing Air Force support when employed in an airborne role.

(2) Limited ground vehicular mobility.

(3) Limited protection against tanks, artillery, nuclear attack, and air attack.

(4) Sensitivity to weather conditions and aircraft availability when employed in an airborne role.

(5) Requirement for combat support and combat service support augmentation when employed in sustained operations.

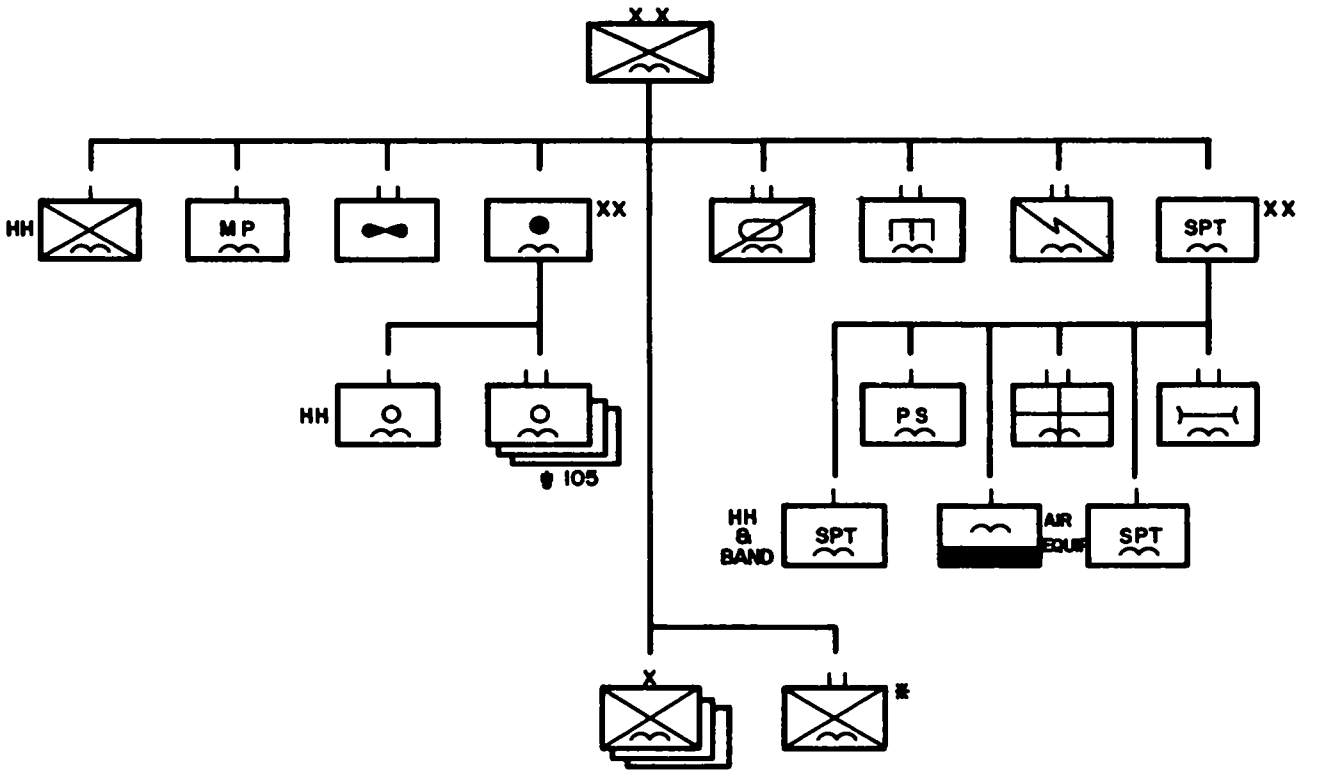
Section II. THE AIRBORNE ENGINEER BATTALION

2–4. Organization

The airborne division engineer battalion (TOE 5–25) consists of a headquarters and headquarters company and three identical combat engineer companies.

2–5. Mission

The primary mission of the airborne division engineer battalion is to increase the combat effectiveness of the airborne division by providing combat support. The battalion may also



* NUMBER OF MANUEVER BATTALIONS MAY VARY.

Figure 2–1. Organization chart, airborne division.

undertake and carry out airborne infantry combat missions and/or support internal defense operations when required.

2–6. Equipment

All items of equipment of the battalion are listed in the applicable TOE. Major items are treated in greater detail in the discussion of the elements of the battalion. All equipment is capable of being delivered by parachute or from landed medium transport or assault aircraft.

2–7. Mobility

The airborne division engineer battalion is 95 percent mobile in organic transportation and 100 percent air transportable in medium transport or assault aircraft. Army aircraft organic to the airborne division provide some degree of mobility throughout the division's area of influence and may be used by the battalion on a mission basis whenever they can expedite the accomplishment of the mission (FM 1–100).

2–8. Assignment

The airborne division engineer battalion is organic to the airborne division, TOE 57.

2–9. Capabilities

Capabilities of the airborne division engineer battalion include—

a. Engineer staff planning for the division.

b. Supervision of organic and attached engineer troops.

c. Limited construction, repair, and maintenance of roads, bridges, fords, and culverts: bridging for passage of short gaps when necessary equipment is delivered to the battalion or otherwise obtainable.

d. Support of hasty and deliberate stream-crossings when reinforced by engineer bridge units.

e. Emplacement and removal of obstacles,

including mines (high explosive and chemical) and boobytraps.

f. Preparing and executing demolitions; planning for the employment of atomic demolition munitions (ADM).

g. Performing engineer reconnaissance and producing engineer intelligence for the division.

h. General construction, including limited construction of assault landing strips and limited repair of captured enemy runways.

i. Providing personnel and equipment for purification of water and operation of water points.

j. Assisting in the assault of fortified positions and assault demolitions of obstacles.

k. Technical assistance to other troops of the division in the construction of obstacles, fortifications, emplacements, camouflage, deception devices, and other engineer matters. Construction of these facilities when required.

l. Engaging in airborne infantry combat-type missions when required.

m. Exploiting locally available sources of materials for construction, fortification, and camouflage.

n. Performing organizational maintenance for engineer, ordnance, and signal equipment organic to the battalion.

o. Performing missions in support of cold war and internal defense operations, especially in the field of military civic action. These missions may require augmentation from the TOE 5–500-series.

p. The battalion has only a limited active air defense (AD) capability. Organic weapons (rifles and machineguns) can provide some protection against low-flying aircraft attacking battalion elements. Employment of such weapons in an AD role should be restricted to retaliatory (self-defense) fires. For slow attack speeds, the techniques contained in FM 23–65, should be used. For fast aircraft, all weapons deliver maximum rate of fire well in front of the attacking aircraft and above its flightpath and cause it to fly through the highest possible volume of fire. Employment of organic weapons in an AD role is governed by unit SOP.

2–10. Methods of Operation

a. One or more engineer companies may be attached to or placed in direct support of an airborne infantry brigade for the airborne assault. The remaining companies are kept under battalion control. Companies attached to brigades revert to battalion control as soon as practicable after the assault, to insure maximum flexibility and economy of effort.

b. Equipment and personnel of headquarters and headquarters company and supporting nondivisional units are employed to reinforce the line companies as required. These elements may be attached to or placed in support of the line companies.

c. Improvement or construction of landing areas (drop, extraction, and landing zones) in the objective area during the assault phase of airborne and airmobile operations is a responsibility of the battalion. The battalion may be reinforced by elements of the airborne light equipment company for construction and maintenance of landing zones or other tasks requiring considerable earthmoving. Reinforcement may be by other types of nondivisional engineer units capable of being airlanded or airdropped. Of special significance are engineer KA and KB teams from the TOE 5–500-series which are airborne-qualified teams capable of supervising and advising, especially indigenous forces, in engineering tasks and projects.

Note. The proposed engineer combat battalion (airborne), TOE 5–195T (tentative), will be ideally suited to reinforce the airborne division engineer battalion, especially for landing zone construction.

d. In internal defense operations, elements of the airborne division engineer battalion may be assigned to political subdivisions such as regions, provinces, districts, or villages on an area or task basis.

2–11. Communications

a. Radio Nets. The airborne division engineer battalion operates stations in division nets and establishes internal battalion nets as required. Figures 2–2 and 2–3 show the radio net configurations normally found in the airborne engineer battalion.

(1) *Division nets.* The battalion normally operates stations in five division nets as follows:

(*a*) *Division command net, SSB-voice.* The battalion communication sec-

tion operates a station for the battalion commander in this single sideband (SSB) voice net. This net normally is restricted to high priority traffic on a commander-to-commander basis.

(*b*) *Division operations-intelligence net, RATT No. 1.* The battalion communication section operates a station in this SSB radio-teletypewriter (RATT) net. This net provides a secure means of passing traffic of an operational-intelligence nature.

(*c*) *Division administration-logistic net, RATT No. 2.* The battalion communication section operates a station in this SSB–RATT net. This net provides a secure means of passing traffic between the battalion and the division support command.

(*d*) *Division operations-intelligence net, frequency modulated (FM) voice.* Both the battalion S3 and the communication section operate stations in this FM-voice net. This net normally is restricted to operational-intelligence traffic of immediate urgency.

(*e*) *Division warning broadcast net, amplitude modulated (AM)-voice.* A receiving station is established at each combat engineer company CP to monitor this voice net. This net is utilized by division headquarters to provide divisionwide warning of CBR attack, fallout patterns, RADSAFE data, nuclear strike warning, or other urgent operation information requiring wide distribution, and to which no reply is required.

(2) *Battalion nets.* The airborne division engineer battalion establishes the following internal nets:

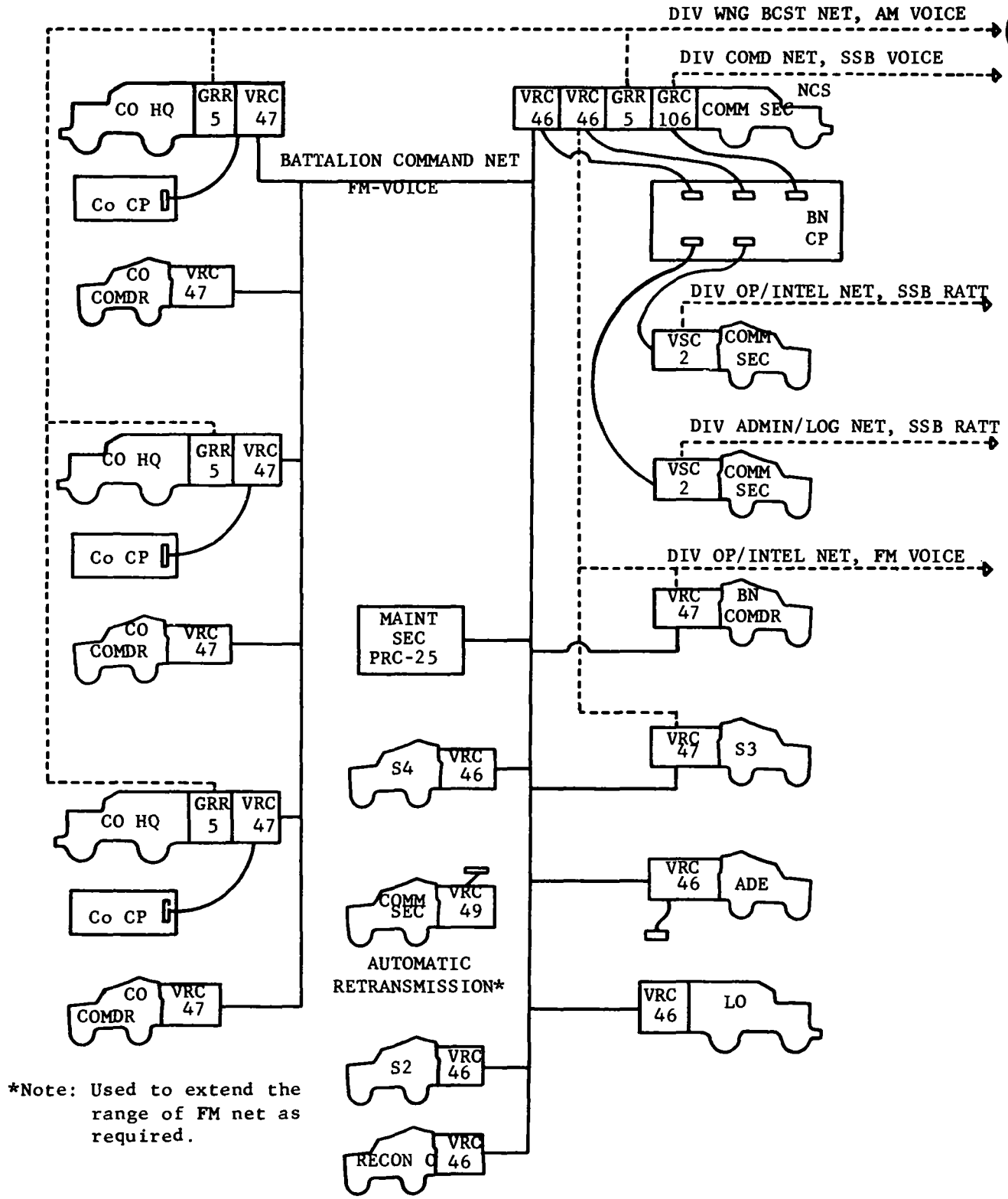
(*a*) *Battalion command net, FM-voice.* This net is the battalion commander personal means of exercising command-control of his subordinate elements. This net normally is restricted to high priority command or operational-intelligence traffic. The battalion communication section has the capability of operating a relay station in this net to extend its range. Subordinate combat engineer companies normally enter this net; however, they may enter the command net of a supported unit when required.

(*b*) *Company command net, FM-voice.* Each combat engineer company establishes its own command net. This net is the company commander's personal means of exercising command and control. Subordinate platoons normally enter this net; however, they may enter the command net of a supported unit when required.

(*c*) *Platoon nets, FM-voice.* Each combat engineer platoon establishes its own general purposes net.

(*d*) *Special application for assault.* Whenever feasible, in the air assault, the air movement should provide for landing the vehicular-mounted radios with their users as soon as possible, so the normal nets can be established. However, parachute delivery into the airhead may require personnel to carry AN/PRC–25s from the combat engineer companies, with one individual in battalion headquarters (communications officer) responsible for parachuting near a radio suitable for entering the division command net. He then acts as a radio relay for communication between division and battalion. This application may then appear as in figure 2–4.

(*e*) *Other nets.* Engineer units operating in an internal defense environment in support of receiving state armed forces, paramilitary, and/or civilian agencies and organizations may be required to operate in the supported unit's AM/FM command and administrative radio nets for physical security as well as command and control purposes. When the communications requirement



*Note: Used to extend the range of FM net as required.

Figure 2–2. Typical battalion radio net.

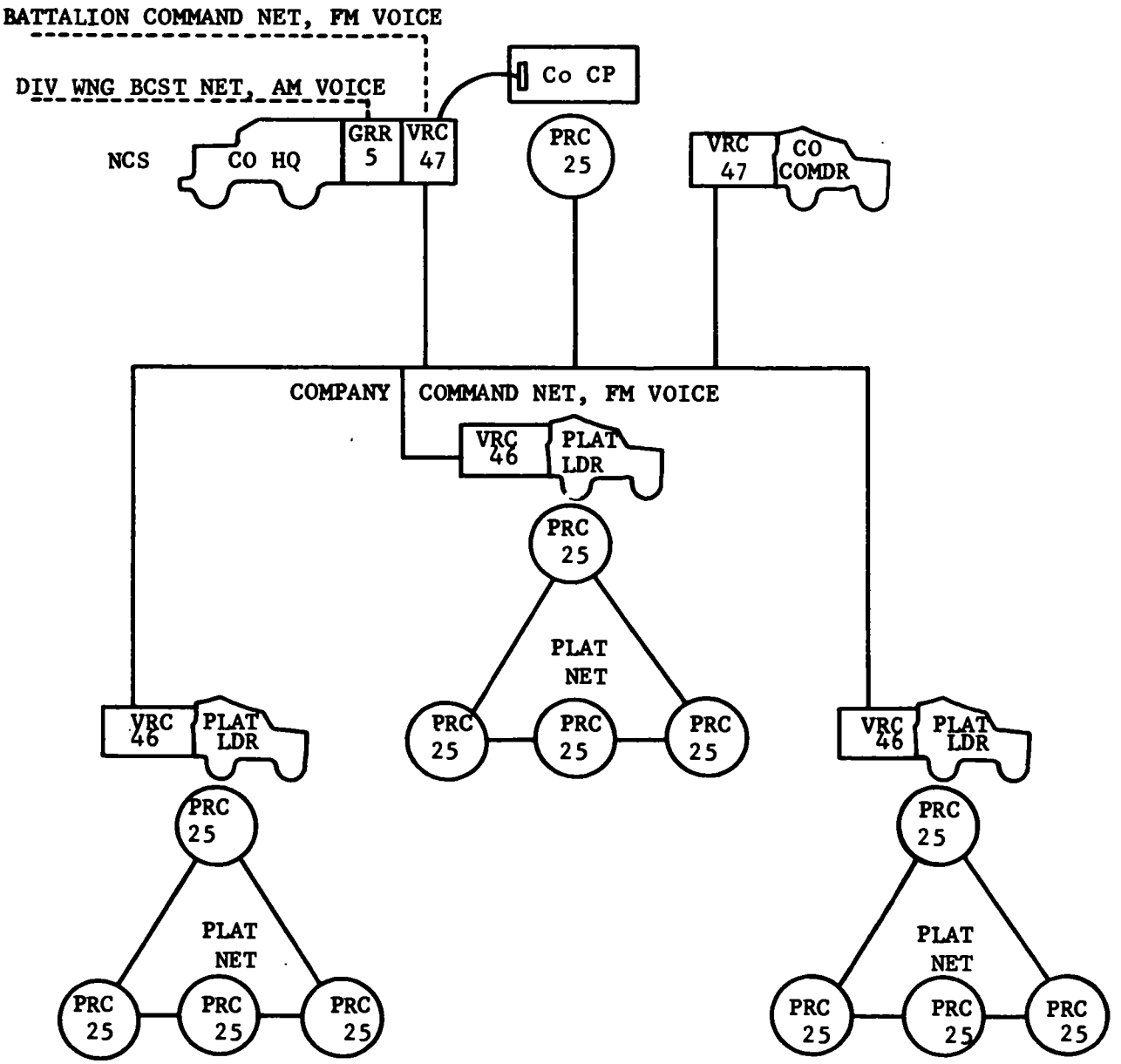


Figure 2–3. Typical company radio net.

exceeds the engineer unit's or its parent unit's capability, assistance first will be sought from the supported organization's parent headquarters.

b. Wire Nets. When a wire net is required, wire communications are established between elements of the battalion. Normally, distances and deployment will preclude direct, battalion installed, wire lines between battalion headquarters and subordinate combat engineer companies. The battalion headquarters and each combat engineer company should enter the division wire system at the nearest division signal center and utilize the division common user telephone system. In internal defense operations, wire nets are highly susceptible to insurgent attack and the use of wire normally will be restricted to internal use with radio

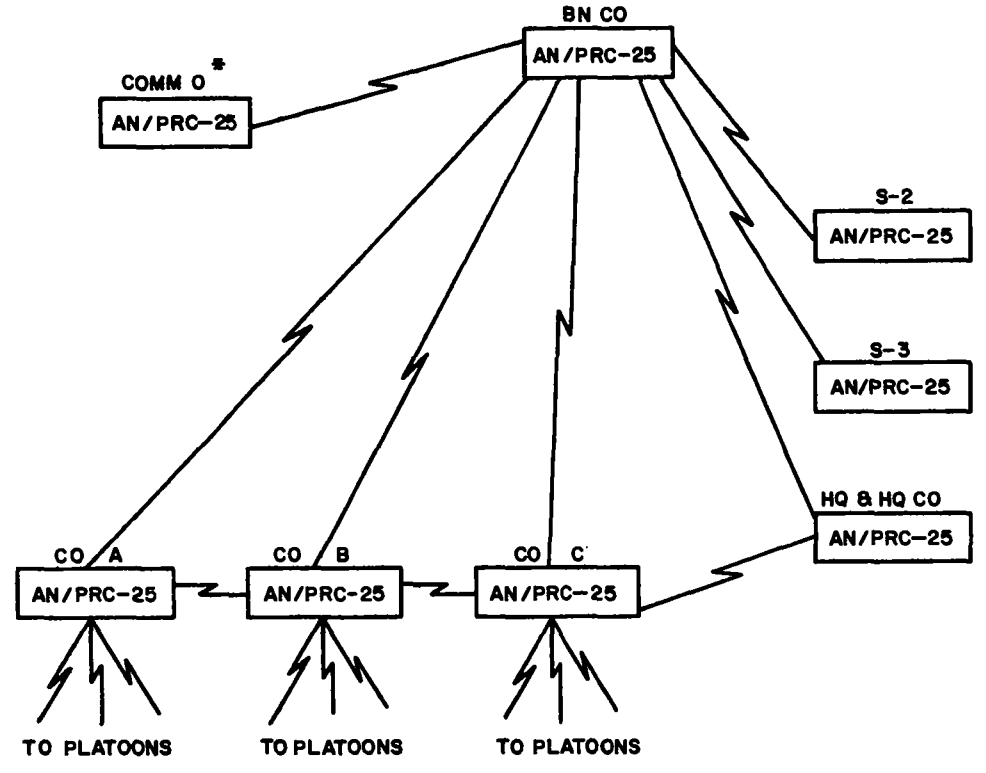


Figure 2–4. Typical assault radio net.

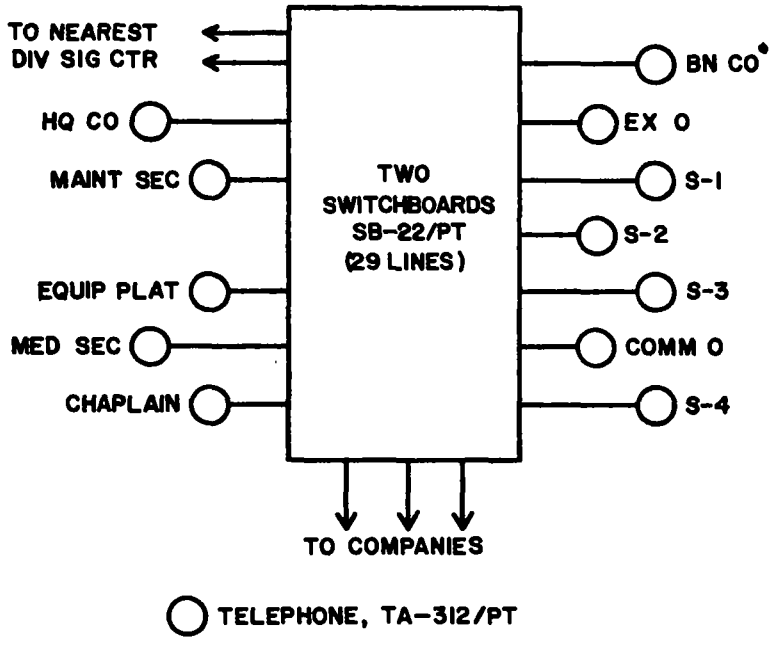


Figure 2–5. Typical battalion wire net.

as the primary means of communication between elements of the battalion. Figures 2–5 and 2–6 show typical wire nets for the battalion and companies.

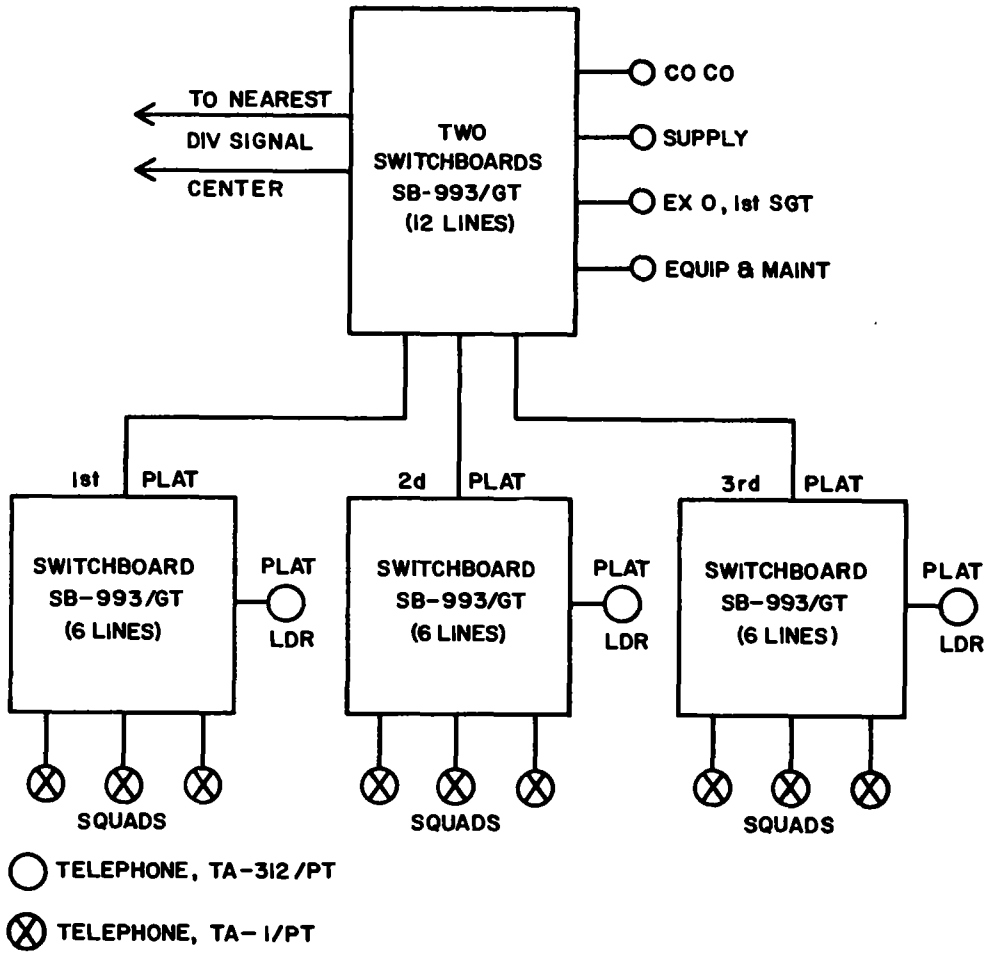


Figure 2–6. Typical company wire net.

CHAPTER 3

HEADQUARTERS AND HEADQUARTERS COMPANY

Section I. ORGANIZATION AND CAPABILITIES

3–1. Organization

Headquarters and headquarters company of the airborne division engineer battalion is organized under TOE 5–26 and consists of two elements; a battalion headquarters and a headquarters company (fig. 3–1).

a. Battalion Headquarters. The battalion headquarters consists of—

(1) Battalion commander (also division engineer).
(2) Executive officer.
(3) Assistant division engineer.
(4) S1.
(5) S2.
(6) S3.
(7) S4.
(8) Engineer equipment officer.
(9) Surgeon.
(10) Chaplain.
(11) Communications officer.
(12) Sergeant major.

b. Headquarters Company. Headquarters company consists of a company headquarters, an equipment platoon, and personnel to man the following battalion headquarters sections:

(1) Administration.
(2) Operations.
(3) Intelligence.
(4) Supply.
(5) Division engineer.
(6) Communications.
(7) Maintenance.
(8) Medical.

3–2. Duties and Functions

a. The duties of the battalion commander and his staff and the functions of the staff sections are as discussed in FM 5–1, FM 33–1, FM 41–10, FM 101–5, AR 600–20, AR 611–101, AR 611–112., and AR 611–201.

b. The equipment platoon furnishes equipment and operators to the engineer companies as required.

3–3. Capabilities

a. Headquarters and headquarters company provides—

(1) Staff planning of division engineer operations and supervision of organic and attached engineer troops.
(2) Potable water for the division through the operation of up to five water points.
(3) Engineer reconnaissance and intelligence for the engineer battalion and the division.
(4) Unit level medical service for the battalion, to include medical care and evacuation, establishment of a battalion aid station, and furnishing aidmen to companies.
(5) Additional construction equipment to companies.
(6) Organizational maintenance and repair service for battalion equipment.
(7) Radio and wire communications for the battalion.
(8) ADM support to the division when TOE 5–570 cellular type ADM teams are attached. The S2, S3, assistant S3, assistant division engineer, and the reconnaissance officer are qualified to plan ADM missions.

b. When engaged in internal defense operations, the battalion is capable of providing all or part of the above support to RS armed and paramilitary forces and civilian agencies, as well as to its parent airborne division.

c. Members of headquarters company can engage in effective, coordinated defense of the unit's area or installation when required, including a limited capability to defend itself against hostile air attack. However, when supporting internal defense operations, security requirements will be increased and security forces may be provided from other U.S. or RS units.

d. When the battalion is committed to a combat role, headquarters and headquarters company functions as an infantry battalion headquarters and headquarters company.

3–4. Major Items of Equipment

The airborne division engineer battalion is equipped on an austere basis so that it can fulfill its airborne mission. Major items of equipment in headquarters company are—

a. Crawler tractor dozers.
b. Scoop loaders.
c. Graders.
d. Dump and cargo trucks.
e. Air compressors and pneumatic tool sets.
f. Trailer-mounted water purification sets.
g. Pneumatic reconnaissance boats.

3–5. Mobility

Headquarters and headquarters company is 90 percent mobile in organic transportation and 100 percent air transportable in medium transport or assault aircraft.

Section II. METHODS OF OPERATION

3–6. Battalion Headquarters

The battalion commander organizes and locates his headquarters in a manner best suited for carrying out his command and staff functions.

a. Location. In addition to other considerations, the headquarters is located to facilitate communication with the division command post, subordinate units, the support command, and any supporting engineer units.

b. Layout. The battalion command post (CP) is laid out to facilitate security, dispersion, concealment, movement to and from the area, and movement within the area. An alternate CP may be established. The assistant division engineer (ADE) is usually located at the division main CP.

3–7. Headquarters Company

Normally, elements of headquarters company are attached to the combat engineer companies for specific tasks. Examples of such attachment are construction equipment with operators medical aidmen, and reconnaissance teams. The remainder of headquarters company is located at battalion headquarters.

3–8. Supply

a. Responsibility. With the possible exception of operations in an internal defense environment, the battalion commander is responsible for the supply of the engineer battalion only and for the production of potable water for the division.

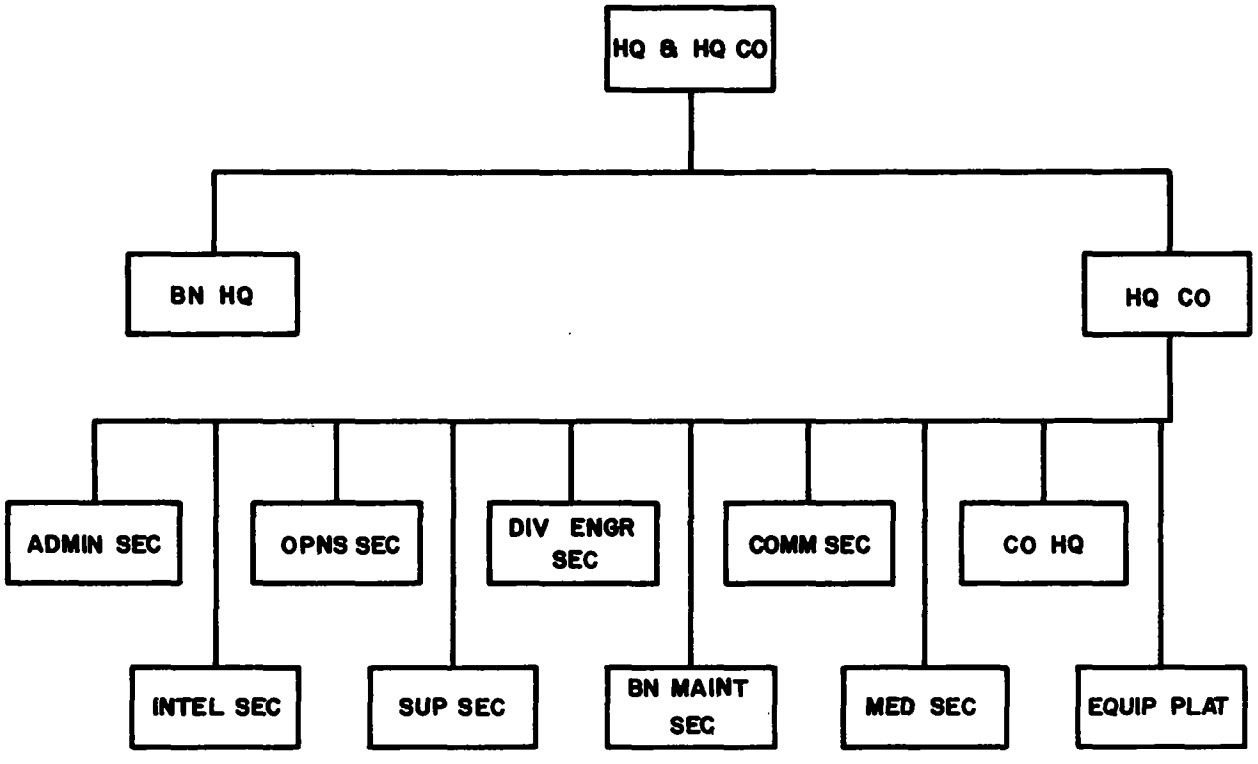
(1) *Ground operations.* Normal supply procedures are followed in the airborne division engineer battalion, except in the first stages of an airborne assault (FM 57–10).

(2) *Airborne assault.* The quantity and types of engineer supplies and equipment to be brought into the airhead are limited by the number and types of aircraft to be used. There will seldom be sufficient airlift to bring in all the desired engineer items. Therefore, maximum use must be made of supplies and equipment locally available. The intelligence effort is specifically directed toward development of sources of supply in the objective area. Some considerations in delivery of supplies and equipment for engineer use in an airborne operation are—

(*a*) Prepackaging of barrier and construction materials.

(*b*) Delivery of materials direct to jobsites or to landing zone nearest using unit.

(*c*) Use of Army aviation when available, particularly helicopters, for delivery from drop or landing zone to jobsite.



NOTE: THIS CHART PORTRAYS THE SOURCE AND DISTRIBUTION OF PERSONNEL IN HQ AND HQ COMPANY. IT IS NOT A CHAIN OF COMMAND CHART.

Figure 3–1. Headquarters and headquarters company, airborne division engineer battalion.

(*d*) Use, in the airborne assault, of individual parachutists to carry explosives for demolitions, or other materials and small equipment necessary to accomplish the mission.

(3) *Internal defense operations.* On occasion, in cold war and internal defense situations, the engineer battalion, airborne division, may be called upon to provide engineer support to forces of an RS, or to augment other existing U.S. forces within a foreign country. Requirements for engineer supplies and equipment, and the production of potable water, especially for civilians, may be magnified; therefore, normal supply procedures may be modified. When possible, maximum use must be made of supplies and equipment locally available. The battalion, may be augmented by teams from the TOE 5–500-series to provide additional capabilities, especially well-drilling, water purification, and water transport teams, required in supporting internal defense or cold war operations.

b. Water. The variable nature of an airborne operation requires that water processing and purification equipment be capable of very rapid displacement and that alternate water points be selected prior to the operation. The equipment may be delivered to the water point by parachute or any available prime mover capable of pulling the trailer. Water production procedures are as set forth in TM 5–700. Appendix C contains minimum potability standards for field water supply.

c. Class IV and V Supplies. Certain class IV and V supplies, such as tactical bridging, mines, explosives, and field fortification materials, when delivered by parachute or airlanded, should be in prepackaged composite loads. These loads should be capable of delivery to worksites, either directly, or by helicopter or vehicle from the drop zone or airlanding facility. An example of a prepackaged composite load of field fortification materials is a load consisting of all mines, pickets, and wire (on bobbins if required) for a 100-meter length of standard minefield.

3–9. Equipment Record Procedures

Equipment record procedures for the control of operation and maintenance of all equipment will be in accordance with TM 38–750.

CHAPTER 4

COMBAT ENGINEER COMPANY

4–1. Organization

The combat engineer company is the basic operating component of the divisional engineer battalion. It is organized under TOE 5–27 and consists of a company headquarters and three identical engineer platoons. Each platoon has a platoon headquarters and three identical engineer squads (fig. 4–1).

4–2. Mission

The combat engineer company is equipped and trained to carry out its mission of increasing the combat effectiveness of major subordinate combat formations of the division by means of general and special engineer work. It performs the tactical engineer staff planning, supervision, and execution of the engineer combat support mission at brigade or equivalent size task force. It also undertakes and carries out combat missions when required.

4–3. Capabilities

The combat engineer company has the following capabilities:

a. Supervision of organic and attached engineer troops.

b. Performing combat engineer tasks, including limited repair and maintenance of roads, bridges, ferries, fords, and culverts. When augmented with the necessary equipment and operators, it can execute more complex tasks such as the construction of roads and airlanding facilities.

c. Assisting in the emplacement and removal of obstacles, including mines (high explosive and chemical) and boobytraps.

d. Preparing and executing demolitions, including preparation of emplacement sites for ADM, when reinforced by equipment and operators from headquarters company.

e. Assisting supported troops in the construction and emplacement of fortifications, camouflage, and deceptive devices.

f. Assisting in the assault of fortified positions.

g. Conducting engineer reconnaissance.

h. Providing technical advice to supported units on engineer matters.

i Engaging in airborne infantry combat missions when required.

j. Providing engineer support to U.S. and receiving state forces engaged in internal defense of cold war war operations.

k. Perform CBR decontamination on a priority basis.

l. The company has only a limited active air defense capability (para 2–9*p*).

4–4. Mobility

The combat engineer company is 100 percent mobile in organic transportation. It is 100 percent air transportable in medium transport or assault aircraft and is air droppable.

4–5. Equipment

a. The combat engineer company is very lightly equipped. Major items in company headquarters are three 3-man, pneumatic reconnaissance boats; one trailer-mounted pioneer electric tool set; one 2½-ton dump truck; five ¾-ton cargo trucks; and two portable, gasoline-engine-driven drills.

b. Each platoon has in platoon headquarters one 2½-ton dump truck; one portable, gasoline-engine-driven drill; a platoon pioneer set; and a platoon carpenter set.

c. Each squad has a ¾-ton cargo truck, a ½-ton platform truck, a chain saw, a demolition set, a squad pioneer set, and a squad carpenter set.

4–6. Employment

a. The engineer company with organic equip-

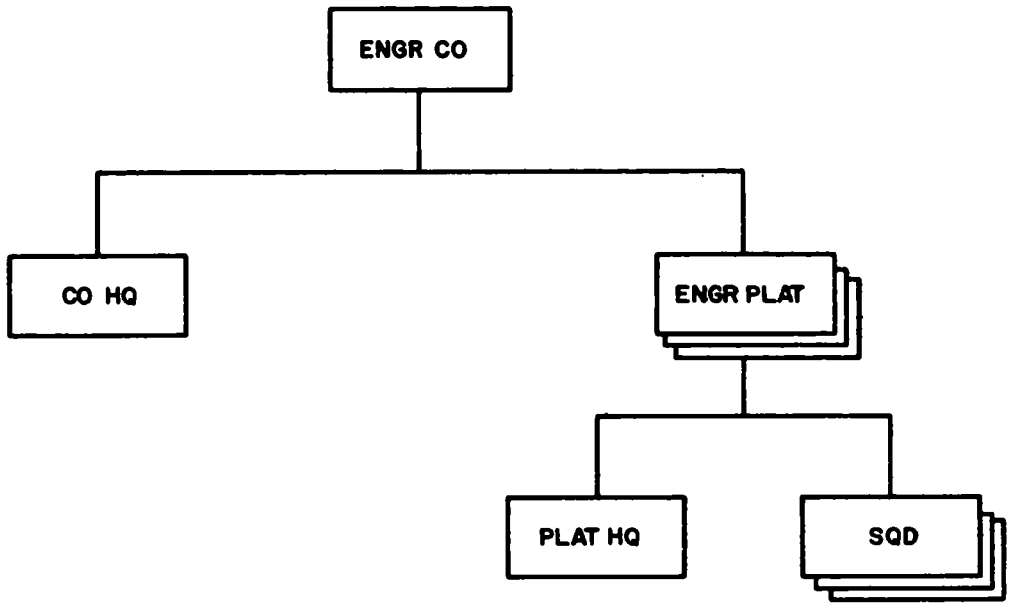


Figure 4–1. Organization chart, combat engineer company.

ment is designed to provide combat engineer support to a brigade or brigade-size task force. It is reinforced with general or special engineer equipment and operators from the headquarters company when necessary to increase the effectiveness of its support.

b. In the airborne assault the company usually is attached to the supported unit. Where the tactical situation permits effective battalion control of the company, it is placed in direct support of the supported unit. One reinforced engineer company normally supports each committed brigade or similar size task force.

c. Each platoon is capable of performing pioneer and demolitions combat engineer support. The platoons are the principal working components of the company and generally operate with it. However, a platoon can also operate independently to provide the engineer support normally required by a battalion task force when it is furnished equipment support by the battalion. In internal defense and cold war operations, platoons operating independently may be augmented by teams from the TOE 5–500-series to provide a greater capability to perform road maintenance, water purification, and military civic action functions. The platoon leader of the supporting engineer platoon is the engineer staff officer for the supported unit. The squad is the basic operating unit of the platoon. It consists of specialists in combat construction and demolitions, and engineer soldiers who are trained in combat engineer tasks. Because of its limited capability, the squad usually functions as a working component of the platoon. There are times, however, when it may be given an independent mission.

CHAPTER 5

BATTALION OPERATIONS

Section I. GENERAL

5–1. Employment

a. The airborne engineer battalion is a self-contained unit designed to provide engineer combat support in the airhead and in the forward portion of the battle area. It has the ability to overcome a variety of obstacles incident to the movement of the division, and hence contributes to the mobility of the division and its capability to maneuver in offensive action. In defense, retrograde, or denial operations, it has the capability to impede the progress of enemy ground operations by blocking critical avenues of approach.

b. The airborne engineer battalion operates as part of division troops and deploys its companies in support of the brigades and combat maneuver elements of the division. The headquarters company contains a limited amount of engineer construction equipment with operators to supplement the engineer companies for specific tasks.

c. The combat engineer companies normally are associated with particular brigades to increase operational efficiency. The company performs the unit engineer functions of tactical engineer staff planning and execution of the engineer missions in this role. Continuous liaison is maintained by the company to the brigade for this purpose.

d. Attached or supporting engineer units should be kept under battalion control when possible. Platoons may be placed in support of battalions or task forces for specific missions.

e. Attachment of engineer teams to combat elements is necessary for accomplishment of specific tasks requiring close command control. In the offensive this may consist of assault breaching or demolition tasks. In defense or retrograde the execution of barrier demolitions and the employment of ADM may require attachment for completion of the specific mission. In the airborne assault attachment is the normal procedure.

f. Airborne engineer troops engage in limited combat incident to accomplishment of their engineer missions. The nature af airborne operations is such that they will engage in combat more frequently than other types of divisional engineer units. Disengagement of engineer elements from the enemy is made by other combat elements to enable the engineers to continue their normal mission. When the situation requires deliberate commitment of the engineer battalion in an infantry mission, the battalion is committed by the division commander who, when possible, preserves unit integrity.

g. When task organizations are committed on separate missions, the engineer battalion provides an appropriate engineer element to accompany the force.

h. When the requirement for engineer support within the division exceeds the capability of the organic engineer battalion, additional engineer support is provided by the next higher echelon of command.

(1) Additional engineer support to the division may range from reinforcing the combat engineer strength to the provision of other engineer units for tasks in bridge construction, road and airfield construction, debris removal, erection of barriers, mapping, survey, camouflage, and deception.

(2) The earthmoving capability of the airborne engineer battalion is extremely limited. Projects involving more than a minimum amount of earthwork require nondivisional support. The air-

borne light equipment company is organized and equipped to provide this support.

(3) Nondivisional engineer units normally are placed in direct support of the division. However, engineer units are attached when the mission necessitates close command control in execution. River-crossings, barrier demolition tasks, or use of ADM are examples of such situations. All engineer combat support provided to the division is coordinated by the division engineer.

i. The airborne division engineer battalion or elements thereof may participate in internal defense or cold war operations. Such participation will support divisional elements engaged in internal defense or cold war missions, or in independent operations will support RS forces or U.S. forces already in-country. For details concerning employment of the battalion in internal defense operations see paragraphs 5–38 through 5–48.

5–2. Standing Operating Procedures

Standing Operating Procedures (SOP) reduce the number, length, and frequency of orders. They establish the regular procedure to be followed in the absence of specific instructions. An SOP is prepared for the battalion and all its operating elements. FM 5–135 contains an example SOP for a divisional engineer battalion.

5–3. Security

Each commander is responsible for the security of his unit. Security includes all measures taken by a commander to protect his unit against enemy interference, surprise, and observation. The measures adopted should be appropriate to the threat. As the threat increases, greater security measures are required to protect troops and equipment in bivouac, during movement, and at worksites. Work parties are normally responsible for furnishing their own security. Occasionally, however, they may be protected by infantry elements to free the work parties to complete the engineer mission. A detailed discussion of active and passive air defense measures is contained in FM 44–1. Security in an internal defense operational environment is discussed in paragraphs 5–38 through 5–48.

Section II. ADMINISTRATIVE MOVEMENTS

5–4. Engineer Assistance to Other Arms

a. Type of Work. The division usually needs engineer support when it moves administratively. A move may be by motor, rail, water, or air. During movements, engineer work generally consists of the following:

(1) Providing facilities and assistance during loading and unliading of divisional elements at point of departure and at destination.

(2) Maintaining roads and bridges.

(3) Preparing the new area to receive the unit. This involves providing or improving facilities.

b. Employment. Engineers provide assistance by keeping some engineers at the point of departure until the bulk of the division has moved; furnishing an engineer advance party to prepare the new area; and sending some engineers with each major echelon moving independently. During administrative movements, engineers normally remain under control of the battalion commander. In general, engineer assistance is limited to work of benefit to the division as a whole or to work for which engineers are better trained and equipped than other troops. Supported units provide their own facilities and labor as far as practicable.

5–5. Engineer Work at Departure Point

a. Type of Work. Engineers at departure points may—

(1) Construct or strengthen ramps and loading platforms.

(2) Construct or improve routes of approach.

(3) Construct or improve preloading assembly area.

(4) Provide technical assistance to troops of other arms to load and lash equipment.

b. Loading Facilities. Every effort is made to choose departure points that require only a minimum of new construction and improvement. In most administrative air movements terminal type facilities for loading, unloading, and intransit handling of cargo and personnel are utilized. There will be situations, however, in which loading ramps and platforms have to be built. In many cases, the engineer battalion will work in close coordination with the airborne division support command in this phase of a division administrative movement.

5–6. Engineer Work on Roads

a. Engineer Reconnaissance. Engineers make a detailed route reconnaissance before a major motor march. The engineer must be able to provide the following information:

(1) Load capacities of roads and bridges, and vertical road clearance.

(2) Estimate of time and effort necessary to put required routes in condition to support division loads.

b. Engineer Work. Engineer work consists of strengthening bridges and repairing roads prior to and during movement of the division.

5–7. Engineer Work at Destination

Troops should be able to move their organic and attached transportation off the road and into their bivouac areas without halting. To make this possible, engineers may have to construct temporary crossings over roadside ditches and gullies, improve secondary roads and trails, and clear new trails. Engineer work at the destination is similar to that at the departure point. Other engineer tasks at the destination include clearing obstacles and traps, area improvement, assisting in the construction of CPs and shelters, repair of existing facilities, operation of water points, construction or repair of roads and bridges within the division area, and detection and marking or clearing of minefields.

5–8. Traffic Circulation

a. When assigned an area of responsibility, the airborne division establishes a division highway traffic headquarters to plan, schedule, route, and direct all highway traffic to conform to military requirements. This headquarters, composed of transportation, engineer, military police, signal, and other specialists as required, attempts to maintain a constant and orderly flow of traffic to realize the full potential of the road net in the division area.

b. The airborne division engineer battalion provides representation/liaison with the traffic headquarters and assists in its mission. This assistance applies generally to all moves and not to administrative moves only. Assistance is provided by—

(1) Conducting road and bridge reconnaissance.

(2) Making recommendations concerning the routes to be utilized as tactical routes and main supply routes based on the load carrying capacity of the road net and the availability of engineer troops to maintain the road net.

(3) Preparing and posting road signs and markers.

c. The traffic headquarters is the general staff responsibility of the division G4. Control of movements is a function of the division transportation officer who coordinates with the provost marshal on traffic control, and supervises the division traffic headquarters.

5–9. Battalion Movement

During administrative movements the airborne division engineer battalion, less those units assigned support tasks, usually moves as a unit forming an integral part of the division.

For all movements the battalion loads its own equipment. Properly prepared administrative movement tables provide the unit with a known system of moving by any mode of transportation. The movement tables are prepared for motor, rail, water, or air movement and are based on pertinent technical data contained in military publications pertaining to each individual piece of equipment and data in FM 101–10, TM 57–210, SB 5–110, and FM 5–35. In the airborne division engineer battalion, emphasis is placed on movement by air, and the battalion must have complete and current movement data available at all times. In addition to transportation by use of cargo aircraft, the use of Army helicopters should be anticipated for transporting elements of the engineer companies. Air-movement tables should be pre-

pared as outlined in TM 57–210 and FM 57–10. For administrative moves loads are planned to permit the most economical utilization of the available aircraft. When possible, key personnel should be distributed throughout the lift to minimize the effect of losses.

Section III. TACTICAL MOVEMENTS

5–10. Introduction

The airborne division makes tactical movements by foot, motor, or air. The mission of the unit, proximity to hostile forces, terrain, types of enemy resistance expected, and activity of hostile air forces are factors that will determine the organization and composition of the column in a tactical movement. All units should have tactical movement tables prepared as a part of their SOP. See paragraphs 5–38 through 5–48 for discussion of tactical movements in internal defense and cold war operations.

5–11. Motor Movement

During a tactical motor movement the airborne division engineer battalion may move in one trip only by augmentation of its organic transportation. Detailed loading plans should be prepared in advance for each vehicle of the battalion. Vehicles organic to the squad of the combat engineer company are insufficient to transport the squad's personnel and equipment. Some of its equipment must be loaded on the platoon headquarter's vehicles.

5–12. Battalion Movement

The airborne division engineer battalion participating in an airborne division tactical movement will normally furnish a company to support each of the leading brigades. The remainder of the battalion moves as directed by the division commander. In some tactical air movements, the battalion will be responsible for providing airlanding facilities at the destination (app B). If preparation of these facilities involves more than an minimum of construction effort, additional engineer support will be required.

Section IV. AIRBORNE OPERATIONS

5–13. Introduction

a. The airborne division engineer battalion is capable of entry into a combat area by either airlanded or parachute means. It is designed to perform combat engineer tasks in an assault role in support of an airborne division. The length of time that the battalion can sustain itself is contingent upon the logistical support provided, the weather, the terrain, the enemy situation, and the extent of engineer effort required for the operation.

b. The division engineer recommends disposition of available engineer troops for all phases of the airborne operation based on the scheme of maneuver as announced by the division commander. The division engineer recommends appropriate changes in disposition as the situation develops and the need arises.

c. If the division engineer determines that the engineer tasks required exceed the capabilities of the battalion, he immediately provides the division commander with information as to the additional engineer forces needed to accomplish the mission. The division commander may request reinforcement. In this case, nondivisional engineer units are placed in support of or attached to the battalion.

d. Because of the intermingling of friendly and enemy forces during the early stages of an airborne assault, the airborne division engineer battalion may be required to engage in ground combat operations for sustained periods more often than engineers in other combat situations. Limitations on the strength of maneuver units in the objective area may further require commitment of the engineer battalion as a fighting reserve. Preparation and training for an airborne assault should emphasize these requirements.

5–14. Planning

In planning for an airborne operation, in addition to the orders and plans issued to the battalion, the division engineer is responsible to the division commander for certain elements

of the division plan and concept of operation.

a. Terrain Intelligence. The battalion S2 will assist the division engineer in planning and preparation of terrain studies and site analyses to support division operations. Support normally may be obtained from an engineer terrain team or engineer intelligence staffs at corps, field army, or theater level.

(1) A terrain analysis, designed for airborne operations, may be prepared for distribution to major tactical commanders designated by the G2. It will include data on the following:
   (*a*) Landing zones, drop zones, extraction zones, and airfields.
   (*b*) Roads, bridges, fords, ferries, and culverts.
   (*c*) Weather and climate.
   (*d*) Cross-country movement conditions, including data on trafficability and rivers and streams.
   (*e*) Water sources.
   (*f*) Obstacles and fortifications.
   (*g*) Tactical considerations including cover, concealment, observation, fields of fire, key terrain, and avenues of approach.
   (*h*) Construction material.

(2) Special engineering site plans should be prepared by the battalion commander and staff.

b. The Selection of Landing Zones and Airlanding Facilities. Sites selected for landing zones and airlanding facilities must be tactically suitable; they must, after improvement if necessary, satisfy the criteria for the aircraft employed; and the construction effort to effect the improvement must be within the capability of the available engineer troops and equipment. Seldom will a site ideally meet all the requirements and some compromise of one or more will be necessary. It is essential, therefore, that site selection be closely coordinated by the tactical commander, the commander of the unit furnishing the aircraft, and the division engineer (TM 5–330).

c. The Engineer Plan of Operation. The success of the engineer portion of an airborne operation is dependent upon well coordinated missions and proper disposition of available engineer troops and equipment. The division air-movement table must be reviewed by the engineer to insure coordinated movement of the engineer battalion into the airhead.

d. Water Supply. Units participating in the assault should carry with them the maximum amounts possible of water in individual canteens and unit water containers. The amount of time necessary to make water points operational can be minimized by careful study of maps and aerial photographs and by delivery of water purification equipment and operators as close as possible to the selected sites.

e. Division Operations Order. Besides making the above recommendations to the division commander and his staff, the engineer, under general staff supervision of the G3, is also responsible for preparing the following annexes to the division operations order, based on the division commander's concept of operation:

(1) *Barrier annex.* For the unit engineer's responsibilities for barrier planning and for drafting the barrier annex, refer to FM 5–135 and FM 31–10.

(2) *Engineer annex.* Refer to FM 5–135 and FM 101–5.

5–15. Marshalling

a. Preparation. After orders have been issued to the engineer battalion, the companies which will be attached to brigades usually join those brigades in specified marshalling areas and prepare for the operation with the supported unit. The remainder of the battalion is marshalled in one or more areas with other division troops. Combat service support is provided by a theater army support command (TASCOM) agency. Units are briefed in sufficient time to allow rigging of equipment and movement of personnel and equipment to departure airfields. Procedures for expedient assembly line rigging are covered in TM 10–500–9. TC 10–1 describes the fabrication and use of various field expedients that may be required to assist in the rigging and outloading of airdrop equipment. FM 57–10 outlines the detailed steps of the preparation for an airborne operation. Detailed rigging procedures for various items of equipment are contained in the TM 10–500-series.

b. Movement to Loading Sites. Elements of the battalion are provided with schedules for

the movement of personnel, supplies, and equipment to loading sites based on the time required for loading and the scheduled times of takeoff. The TASCOM agency provides ground transportation as required.

c. Loading.

(1) Units are responsible for loading and lashing their accompanying supplies and equipment. Troop carrier personnel provide technical assistance.

(2) Heavy drop loads are prepared in the vicinity of loading sites in order to reduce the requirement for transportation support.

(3) Aircraft loads are based, insofar as practicable, on the ground tactical plan.

(4) The Air Force is responsible for providing loading aids at the aircraft loading sites, and tiedown devices to secure the airdrop equipment aboard the aircraft.

5–16. Airborne Assault

a. Air-Movement. The engineer battalion accompanies the airborne division into the airhead area and is delivered in accordance with the division air-movement table by airdrop or airlanding.

b. Reorganization. Immediately upon arrival in a landing zone or drop zone, elements of the battalion assemble in predesignated areas. Those units with preassigned tasks move directly to their worksites. Engineer reconnaissance is initiated and is continued throughout the operation. Close coordination with infantry elements must be maintained to assure that the areas of engineer work have been secured. Battalion headquarters and headquarters company moves to a preselected area and establishes its command post.

c. Command Posts.

(1) *Organization.* As soon as possible after the initial airborne assault, the battalion and its companies establish operational command posts and communications nets. The organization of a command post is the responsibility of the unit commander. It is accomplished in a manner which best suits the needs of the unit and is based on the capabilities of the headquarters itself.

(2) *Alternate command posts.* Active nuclear warfare requires the establishment of alternate command posts to assure continuous operation. The division engineer may designate the liaison officer of the division engineer section as the nucleus of an engineer staff section at the alternate division command post. The limited number of personnel assigned to the airborne division engineer battalion headquarters may preclude the establishment of an alternate command post. A less efficient but feasible solution is to designate the physical location of an alternate battalion command post. This location serves as a rallying point for survivors and permits rapid reconstitution of the battalion headquarters following a nuclear attack. The unit SOP should provide as much guidance as possible on this subject.

d. Supplies and Equipment. Where the coordinated air-movement plan allows delivery of supplies and equipment directly on the worksite, the engineers' problems have been reduced. Where this cannot be done the original plan must provide for delivery of engineer supplies and equipment on the landing zone or drop zone nearest the worksite. Upon delivery, the supplies and equipment are collected by the engineer troops and moved to the worksite. Where supplies are to be used at more than one worksite they may be moved to a location which permits ready access by the using units.

e. Delivery Methods. Supplies and equipment may be delivered by a variety of means. Airland and normal airdrop by parachute are the most familiar and widely used. Several new methods have recently been developed and successfully employed.

(1) *Ground proximity extraction system (GPES).* In this USAF method, loads are rigged on reinforced pallets and placed on rails in the cargo compartment of the aircraft. A line from the load terminates in a hook attached to a boom trailing out the rear cargo door. As the aircraft makes a low-level pass over the extraction zone the

hook engages a steel cable stretched across the extraction zone and the cargo is snatched out of the cargo hold. Nylon straps extend from each end of the cable and are wrapped around hydraulically-dampened drums placed on each side of the extraction zone. The drums pay out the nylon straps slowing the load to a stop.

(2) *Low altitude parachute extraction system (LAPES).* This is a USAF method of pulling the cargo out of the opened rear of an aircraft by deploying a parachute as the aircraft flies across the extraction zone at low altitude and low speed. The extraction parachute, attached to a reinforced pallet, is 15 feet in diameter for loads up to 8,000 pounds. The parachute is deployed at a designated point in advance of the release point and remains open behind the aircraft. The pilot, in radio contact with a combat control team on the ground, releases the pallet on signal.

(3) *Heavy equipment parachute system (HEPS).* This USAF method is the same as LAPES but for heavier loads, up to 17,000 pounds, using a parachute 35 feet in diameter.

(4) *Parachute low altitude delivery system (PLADS).* In this USAF system, loads of up to 2,000 pounds are extracted from the cargo compartment and lowered to the ground from an altitude of 200 feet. The extraction parachute is initially deployed in a "reefed" (partially opened) condition, about 1,000 feet from the drop zone. At the precise moment of drop, an electric "reefer cutter" fully opens the chute which then extracts the load. Upon extraction the load swings to a vertical position and almost immediately lands. Its landing is cushioned by the parachute. This is a highly accurate method of delivery and it has the capability of night and bad weather drops.

5–17. Subsequent Operations

After complete reorganization and communications have been established, accompanying supplies delivered and recovered, and initial engineer projects started, the engineer battalion enters into a normal engineer support role for the airborne division. Additional missions are assigned to the battalion by the division commander, and are then assigned as projects to the subordinate units of the battalion. The major engineer effort is usually directed toward improvement of landing areas, roads and bridges, and toward execution of barrier and blocking operations. Attached engineer companies revert to battalion control as soon as possible, but may remain in direct support of the brigades to which they were attached for the airborne assault. Subsequent operations of the division may include continued defense of the airhead to include delaying actions, withdrawal, or offensive operations to include exploitation and further airborne assaults.

5–18. Exploitation

a. After the division airhead line is established, the assault may be exploited by the division by one or more of the following:

(1) Improving the area for development as an advance airbase, naval base port, storage area, or missile site, and providing for its security.

(2) Launching large-scale ground operations from the area. The division's lack of armor and limited ground mobility reduce its capability for this type of operation unless it is augmented.

(3) Seizing or denying the enemy use of critical terrain, road and rail nets, waterways, signal communications facilities, and natural resources, and protecting potential allies.

(4) Destruction or capture of enemy forces, missile sites, and airfields.

(5) Seizing terrain or other objectives inaccessible to other types of ground troops.

(6) The capture and utilization of manufacturing areas, resources, or governmental control facilities and agencies as directed.

b. The exploitation missions normally are

determined during the planning stages of an airborne operation, and the engineer support required for them is planned accordingly. It will usually be necessary to have additional engineer support introduced into the airhead to augment the airborne division engineer battalion, or to permit relief of the divisional battalion from airhead tasks to work in support of exploitation operations. Typical engineer support units are the airborne engineer light equipment company delivered by parachute or airlanded, an engineer bridge company, or elements of a combat engineer battalion (Army) delivered by airlanding.

c. Other exploitation operations which may require engineer support are raids against targets of opportunity, blocking enemy reinforcement or withdrawal, reinforcing other units which have been operating independently, advancing successively to secure critical areas ahead of or to the flanks of friendly armored or other mobile forces, and blocking or counter-attacking enemy penetrations of other ground forces. These operations can be performed by employing normal ground transportation, Air Force or Army transport aircraft, or by parachute operations from the established airhead. Engineer support for the those operations may be in direct support or by attachment to the infantry elements conducting the operation. The ability of the airborne division to conduct operations from the objective area will depend upon:

(1) The enemy situaton.

(2) The division's own capability with particular emphasis on the buildup of supplies and personnel which can be introduced into the airhead.

(3) The number and status of airlanding facilities. The construction or improvement of airlanding facilities is a determining factor, and the engineer will require additional support from other engineer units, particularly the airborne engineer light equipment company or the engineer combat battalion, airborne. Advance elements from these units may accompany the engineer battalion in the initial airborne assault with additional personnel and equipment delivered as a planned portion of the air-movement of engineer troops and equipment for the division.

5–19. Withdrawal

Withdrawal from an objective area may be forced by the enemy or may be made voluntarily. Advance planning is imperative, as the nature of the area of operations and the limitations of transport aircraft introduce complicating factors not present in other ground actions. Supplies and materials which cannot be evacuated are destroyed. The engineer battalion supports the airborne division in this type of operation by—

a. Construction of obstacles to prevent any enemy advance which would interfere with the withdrawal.

b. Preparing or maintaining airlanding facilities to accommodate the necessary aircraft for the withdrawal.

c. Providing adequate road nets and bridging for the units moving to the departure facilities.

d. Assisting in the destruction of equipment not capable of being withdrawn.

e. Engaging in limited ground combat operations.

Section V. MOVEMENT TO CONTACT AND THE ATTACK

5–20. Introduction

When the infantry units move from the drop or landing zones to their initial objectives or to the prescribed airhead line positions, the movement to contact and the attack are initiated. Engineers may be used in the advance guard and in the flank and rear security forces as well as in the main body.

5–21. Specific Engineer Duties

a. During the movement to contact, speed is essential. Maximum use of existing road nets and avenues of approach is emphasized. Early seizure of critical terrain is also important. Engineers assist the troops protecting the flanks by creating obstacles in roads and other possible avenues of approach to the flanks includ-

ing contamination of obstacles with chemical landmines or agents and by the use of flame mines and flame expedients. Nuclear fires, including atomic demolition munitions (ADM) which is an engineer responsibilty, may be employed to provide added security by blocking enemy avenues of approach. To provide this ADM capability, the engineer battalion must be augmented by TOE 5–570 ADM teams. Other duties in the movement to contact include conducting reconnaissance; opening and improving roads, trails, and bridges for troop movement, supply, and evacuation; reducing obstacles; assisting in the passage of defiles and minefields; and constructing bypasses.

b. Engineer reconnaissance during the movement to contact normally is performed by reconnaissance teams from headquarters company. Routes of advance are thoroughly examined for serviceability, type, condition, location of critical points, alternate routes, mines, and condition and types of bridges.

5–22. Control of Engineer Effort

a. Disposition of Engineer Troops. In addition to the normal association of an engineer company in support of a particular brigade, consideration must be given to the engineer tasks to be accomplished in each objective area to determine the final disposition. The engineer unit may be placed in direct support of, or attached to, the supported unit and may be given work to accomplish on an area or task basis, or a combination of both.

b. Responsibility for Control. The division engineer maintains contact with supporting and attached elements to assure that maximum value is obtained from the engineer effort expended. The supporting enginer unit commander retains control and command of the engineer elements, but must suit his plans and troop employment to the plans of the supported unit or units.

c. Liaison.

(1) Liaison between supporting and supported units must be maintained during the attack to assure cooperation and coordination between all units participating in the operation.

(2) The assistant division engineer is the chief liaison agent between the airborne engineer battalion and division headquarters. Liaison functions between the supporting engineer companies and the brigades are usually performed by the company executive officer or other agent designated by the company commander.

5–23. Engineer Duties in the Attack

Typical engineer duties in the attack include—

a. Conducting reconnaissance.

b. Assisting in the preparation of traffic circulation plans.

c. Assisting forward movement of infantry and supporting arms by repairing roads, constructing expedient bridges, and removing obstacles.

d. Assisting in locating, marking, and removing mines, to include chemical mines.

e. Assisting in flank security through the use of demolitions (including ADM), minefields, to include chemical and flame, and other obstacles.

f. Constructing pioneer or hasty Army airfields for divisional aircraft.

g. Constructing or improving airlanding facilities, drop zones, and extraction zones for assault type cargo aircraft.

h. Performing other duties such as the operation of water points.

5–24. Engineer Reconnaissance

a. Engineer reconnaissance during the movement to contact is performed initially by the reconnaissance teams from battalion headquarters and by reconnaissance elements from the engineer units supporting the infantry. These teams provide the division and the brigades with early reliable information concerning the terrain over which the unit is to advance.

b. Engineer reconnaissance during the movement to contact should include information on—

(1) Serviceability and types of roads.
(2) Location of critical points.
(3) Alternate routes.
(4) Mines, to include chemical and flame.
(5) Bridges and river-crossing sites.
(6) Suitable sites for landing zones, drop zones, and extraction zones.
(7) Locally available construction equipment and materials.

(8) Water sources.
(9) Estimates of engineer effort required.
(10) Recommended traffic circulation.
(11) Obstacles to include radiological contamination.

5–25. Pioneer Work Done By Other Arms

Because there are seldom enough engineer troops available to do all the pioneer work necessary to assist the advance of the infantry and supporting arms, the other troops do as much of this work as possible to help themselves. All troops are trained in the installation and removal of mines. Infantry troops do much of their own pioneer work, assisted by technicians from the supporting engineer companies.

Section VI. THE DEFENSE

5–26. Introduction

a. After assault objectives have been seized in an airborne operation, the airborne force normally suspends offensive operations temporarily to secure and organize the objectives. The period of time involved will vary depending upon the mission assigned to the airborne division, the size and composition of the force, enemy reaction, and the type of operation contemplated.

b. Defense of the airhead generally consists of a variation of the area defense. The defense envisions organizing and occupying strongpoints on dominant terrain along the airhead line to cover main routes of approach into the airhead; covering unoccupied terrain between defended localities and natural obstacles by fire, mines (to include chemical and flame), and other artificial obstacles; employing appropriate passive air defense measures to avoid air attack with provisions to actively engage attacking aircraft in self defense; continuous and intensified reconnaissance and surveillance during the hours of darkness; formation of a reserve and establishing priorities for designation of new or additional reserves. Organized defensive forces are employed to blunt and stop enemy attacks; mobile reserves are deployed to reinforce or block in threatened areas; and counterattack forces are employed in spoiling attacks, or in attacks to destroy the enemy forces or eject them from the airhead. The shape of the airhead affords the airborne division interior lines of communication, facilitating shifting of troops and commitment of reserves. Reserves are held in positions of readiness prepared to counterattack, to occupy defense positions, or to execute blocking missions. Positions are prepared in depth within the capabilities of the airborne unit. The airhead defensive line must provide adequate space for maneuver, for protection of critical installations, and for airlanding or air-evacuation operations (FM 57–10).

5–27. Engineer Functions in the Defense

Defensive positions usually are laid out and constructed by the troops which are to occupy them. Engineers may be used to prepare alternate or supplementary positions and to perform such duties as—

a. Repairing, maintaining, and improving roads for mobile reserves and counterattack forces, access to defensive positions, and supply and evacuation, and recommending traffic circulation plans.

b. Preparation of and assisting in implementation of the barrier plans.

c. Assisting in the construction of command posts, observation posts, and obstacles of all types.

d. Providing engineer intelligence.

e. Providing technical assistance in camouflage.

f. Engaging in limited ground combat.

g. Improving and maintaining airlanding and air delivery facilities.

h. Conducting reconnaissance.

i. Operating water points.

5–28. Barrier Plan

Because of its lack of tanks and other armor protected vehicles, the airborne division is extremely vulnerable to armor attack. Among other measures rapid erection of obstacles reduces this vulnerability.

a. Barrier plans are developed concurrently with other tactical plans and are planned and executed by all echelons of command. However,

only corps and higher commanders have the authority to employ barriers on an extensive scale. This authority may be delegated to division and comparable commanders. The division engineer prepares terrain and barrier studies for G2, and advises G3 on the means and extent of augmenting natural obstacles. He plans and supervises the technical aspects of barrier employment and prepares the barrier annex to the operation plan or order, under the direction of the division G3. Division barrier and obstacle planning usually is supplemented by detailed planning of tactical obstacles at brigade level.

b. Construction of obstacles for close-in defense and security is the responsibility of the unit commander. These obstacles may be integrated into the barrier plan of the division or higher command. Normally each unit constructs that part of a barrier system which lies within its area of responsibility.

c. The airborne division engineer battalion furnishes assistance to other division elements in the form of technical advice, supervision, and construction effort. It is responsible for siting and constructing individual obstacles (in addition to those in its own area of responsibility) when one or more of the following conditions exists:

(1) Special skills and equipment are required.
(2) Exposed flanks or rear require protection.
(3) The command as a whole will benefit.
(4) The obstacles must be prepared before the arrival of the troops who are to occupy the area.
(5) The obstacles lie outside the area of responsibility of any particular unit.

d. To ease the logistic burden inherent in airborne operations maximum use must be made of locally available materials for obstacle construction. Atomic demolition munitions may be used to create obstacles. Minefields, within the logistic capability, are used in likely routes of armored approach. For details on barriers see FM 31–10.

5–29. Defense Against Nuclear and Chemical, Biological, and Radiological (CBR) Attack

a. Normal defensive measures are employed with emphasis on individual protective measures and unit radiation exposure control. (For details see FM 21–40 and FM 3–12.) Particular stress is placed on the importance of deep foxholes and the provision of overhead cover. The airborne division engineer battalion conducts the following tasks in defensive planning for nuclear or CBR attack:

(1) *For the division.*
  (*a*) Surveys area for suitable shelters and assists in planning and constructing protective facilities for key installations.
  (*b*) Selects alternate water points.
  (*c*) Selects and prepares an alternate bridge site or bypass for each bridge required.
(2) *For the battalion.*
  (*a*) Disperses unit personnel, equipment, and supplies consistent with operational practicability.
  (*b*) Organizes unit first aid, rescue, and evacuation teams.
  (*c*) Prepares a CBR defense SOP based on that of the division.

b. In the event of a nuclear detonation or a CBR attack, the airborne division engineer battalion accomplishes the following:

(1) *For the division.*
  (*a*) Decontamination of essential areas or of exit routes required for evacuation to safe areas.
  (*b*) Construction and posting of signs for unsafe areas.
  (*c*) Firefighting missions.
  (*d*) Clearance of debris from essential routes and airlanding facilities.
  (*e*) Production of maximum amount of potable water.
  (*f*) Such other engineer tasks as are required.
(2) *For the battalion.*
  (*a*) First aid, rescue, and evacuation.
  (*b*) Operation of personnel and equipment decontamination stations.

5–30. Defense Against Airborne Attack, Guerrilla Action, and Infiltration

The airborne division engineer battalion establishes, within its area of operation, an obser-

vation and warning system and local security adequate for defense against enemy airborne, guerrilla, and infiltration tactics. The battalion may be called upon to construct obstacles for the division which would act as a deterrent to the use of such enemy tactics.

Section VII. DENIAL OPERATIONS

5–31. Introduction

A denial operation is designed to prevent or hinder the enemy's use of or benefit from an area, personnel, facilities, or material. It may include destruction, removal, contamination, or erection of obstructions. Denial operations are basically strategic in concept. Staff responsibilities for denial operations plans are the same as for barrier plans (para 5–28). In the division, denial operations are incorporated normally in the barrier plan. All troops participate in denial operations, particularly in the removal or destruction of organic equipment and supplies, procedures for which normally are included in unit SOP. Large scale demolitions, and denial targets that are technical in character, usually are assigned to the divisional engineer battalion.

5–32. Denial By Destruction

All possible methods of destruction are used. The most common are fire, flooding or drenching, mechanical (breaking with a sledge hammer), chemical and radiological contamination, and explosives including ADM and projectiles (small arms, artillery, and bombs). So that destruction may be executed at the desired time, personnel to destroy each item are designated in advance; supplies necessary for the destruction are obtained and stored at convenient locations; the circumstances under which destruction is to take place are definitely prescribed; and, if orders for destruction are to be issued, the means of transmission are provided. According to the Rules of Land Warfare of the Geneva Convention, medical supplies will not be destroyed intentionally but other supplies which cannot be evacuated are destroyed.

5–33. Denial By Removal

Evacuation of material is as much a part of denial operations as destruction. All possible military supplies and equipment are evacuated. Evacuation is started early and conducted in accordance with prepared priority lists. Every available means of transportation is used to capacity.

5–34. Atomic Demolition Munitions

When augmented with ADM teams from the TOE 5–570–series, the airborne division engineer battalion may use atomic demolition munitions in denial operations. With ADM, it is possible to destroy targets which otherwise would be difficult or impossible to destroy. Denial targets suitable for the employment of ADM are airfields, defiles, underground installations, and tunnels. For details on the employment of ADM, see FM 5–26.

Section VIII. RIVER-CROSSING OPERATIONS

5–35. Introduction

a. The airborne division, or elements of the division may, when suitably equipped, conduct river-crossing operations as follows:

(1) During the initial establishment of the airhead.

(2) While conducting link-up with friendly forces.

(3) While conducting aggressive reconnaissance from the objective area.

(4) As a portion of a raid from the objective area.

(5) While expanding the airhead as a means of providing more space for additional airlanded elements.

(6) As a part of normal ground operations subsequent to an airborne operation.

b. River lines and the possible requirement for river crossings during the early stages of an airborne assault must be carefully considered when the objective area and the airhead line are selected during the planning phase. Wide rivers provide excellent natural obstacles as a part of the airhead line, but may require river-

crossing operations by the airborne elements in further situations.

5–36. Capabilities

The airborne division engineer battalion has no organic stream-crossing equipment. However, personnel of the battalion have the technical training to construct standard military floating and fixed bridges. Expedient construction may be practical under certain conditions for hasty crossings of short gaps.

5–37. Conduct of River-Crossing Operations

a. Hasty crossings of unfordable streams and small rivers may be accomplished by the airborne engineer battalion provided the bridging is delivered to the constructing unit.

b. Deliberate river-crossings of large streams must be supported by additional troops and equipment. The airborne division engineer companies cross with the airborne brigades to provide support on the far shore. Corps or Army engineer troops furnish the necessary equipment and construction crews to accomplish the bridging mission and all near shore support. The conduct of river-crossing operations is explained in detail in FM 31–60.

Section IX. INTERNAL DEFENSE OPERATIONS

5–38. General

a. The doctrine for employment of the airborne division engineer battalion in limited and general war, offensive and defensive operations, applies, with significant modification, to internal defense situations constituting military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat subversive insurgency. If the insurgency has escalated to include guerrilla warfare or mobile warfare, internal defense operations will include counterguerrilla and mobile warfare activities.

b. The ultimate objective in combatting the insurgency is to eliminate the causes of the insurgency and prevent its recurrence. Engineer combat units may support both tactical and nontactical units conducting operations over vast areas, and the operational plans of the division or brigade must anticipate the difficulties of control of operations and maintenance support. Most important will be the complete integration of engineer operations into the overall field internal defense operations (clear and hold) being conducted in a particular area such as a region, province, district, corps, or division. This may entail support of U.S. and/or RS tactical units in tactical operations, support of receiving state agencies in internal security operations, assisting receiving state forces in military civic action, assisting receiving state through advisory assistance by providing mobile training teams (MTT) to receiving state armed forces, paramilitary or civilian agencies.

c. For a general discussion of engineer units in internal defense operations, see FM 31–22. For additional guidance in internal defense operations, see FM 31–22A, FM 31–73, FM 100–5, and FM 100–20.

5–39. The Internal Defense Environment

a. In internal defense operations many factors contribute to making the environment different from that of conventional or nuclear positional warfare. Among these factors are—

(1) The terrain generally is poor for operations.

(2) Forces usually are dispersed over an extremely wide area.

(3) In guerrilla warfare situations, the adversary generally is elusive, hard to identify, highly trained in the techniques of guerrilla warfare, and well motivated.

(4) Sophisticated insurgent paramilitary or armed forces, organized and equipped in battalion or larger size units, may conduct mobile warfare. See FM 100–5 for discussion of insurgent mobile warfare.

b. Winning the support of the people is a continuous requirement in internal defense operations; in this respect, the application of firepower must be highly selective and restrained when operating among a population whose material and physical well-being must be protected in order not to alienate them from the RS government.

c. Since units usually are dispersed over ex-

tremely wide areas, command supervision, to include training, maintenance, and other activities, will be much more difficult.

d. Because of the nature of the terrain and the critical need for numerous construction projects, and the nationwide lack of engineer skills, there will be an especially heavy demand for engineer unit skills and knowledge.

e. Small unit commanders frequently will be required to make decisions based on their own judgments, considering the situation at hand, rather than on specific guidance and directions received from higher headquarters. The imagination and initiative of individual engineer commanders will contribute to the effectiveness of the engineer effort in internal defense operations.

f. All engineer commanders are responsible for the security of their commands. In internal defense operations, security requirements will be considerably increased, particularly at isolated worksites and during movement to and from the worksite. Engineer units may often require protection by other tactical forces to preclude security requirements from hampering the engineer mission.

(1) In internal defense operations, all movement is subject to ambush. The organization of convoys and degree of protection required will depend on the actual or potential capabilities of the insurgents in the area through which the convoy will travel. All movements must be treated as tactical moves and appropriate actions taken. Airborne engineer units must be properly trained in counterambush techniques to insure a high probability of surviving ambushes. See FM 31–16, FM 31–22, and the FM 7-series for detailed discussion of counterambush measures.

(2) An airborne engineer unit in a static position may require perimeter protection. This can be achieved by using its own troops or by arranging for security forces from other U.S. or RS armed forces or RS paramilitary and police units. See FM 31–22 and FM 7-series for defensive measures.

5–40. Mission of Airborne Engineers in Internal Defense Operations

In addition to supporting the parent airborne division, the engineer battalion may support U.S. MAAG, Missions, Military Assistance Commands (MAC), U.S. and/or receiving state armed forces, RS paramilitary forces, and U.S. and/or receiving state civilian agencies. Support may entail conducting tactical operations, supporting RS agencies in internal security operations, assisting RS and U.S. forces in military civic action, assisting the RS through advisory assistance by providing MTT to RS armed and paramilitary forces or civilian agencies, or conducting these operations independently as part of the overall operation in a particular area; and, finally, participating in intelligence and psychological warfare operations. Augmentation from TOE 5–500, 33–500, and 41–500-series may be required to provide a greater capability to adequately perform all missions. For a general discussion of engnieer units in internal defense operations, see FM 31–22. For additional guidance in internal defense operations, see FM 31–16, FM 31–22A, FM 31–73, FM 100–5, and FM 100–20.

5–41. Concept of Operations

The ultimate objective in preventing or combatting the insurgency is to eliminate its causes and prevent its recurrence. Airborne engineer units may support both tactical and civil elements conducting operations over vast areas. Typically, RS will be critically short of engineering skills, both within the military and the civilian structures. United States engineer skills should be applied whenever and wherever they can best augment the receiving state. Most important will be the complete integration of engineer operations into the overall operations being conducted in a particular area, such as a region, province, district, corps, or division.

5–42. Organization

The airborne division engineer battalion, when committed, usually will maintain its organizational integrity, but may be organized provisionally into task forces, depending upon the particular engineering skills and equipment required. Airborne engineer units may be attached to or placed in direct support of U.S.

units other than the parent division and/or RS tactical forces when the support requirements exceed the capabilities of the other U.S. or RS tactical units' organic engineers. Direct support is desirable since it allows the airborne engineer battalion flexibility in meeting engineer support requirements throughout the operational area; however, since the supported units may often conduct several types and sizes of operations simultaneously, in widely separated locations, attachment may be the most common and desirable method of employment.

5–43. Tactical Operations

The doctrine for employment of airborne engineer units in limited and general positional warfare offensive and defensive operations applies with modification to internal defense situations. If the insurgency has escalated to include guerrilla or mobile warfare, internal defense tactical operations will include counterguerrilla and mobile warfare activities. Positional warfare tactics and techniques must be modified to fit the special requirements of the operational environment and the nature of the insurgent threat. When supporting tactical operations against insurgent forces, the airborne division engineer battalion must take advantage of its superior flexibility and mobility.

a. Since airborne engineer units often will be supporting tactical forces in isolated locations, they may be required to assist in the static defense of the village, outpost, camp, or similar installation in which they are quartered. Airborne engineer units may also be designated as reserves and required to provide defense of an installation while the installation's main defense force is aiuing a similar installation under attack. Type tasks which airborne engineer troops may perform in support of tactical operations in internal defense are essentially the same as for conventional warfare.

b. The scope of engineer support for tactical operations will be considerably increased, particularly in underdeveloped areas of the world. Engineer units should expect and be prepared to furnish more than the "normal" amount of tactical support and assistance in such fields as water purification, route maintenance, airstrip and helipad construction, bridging, and construction of hasty fortifications. This increased scope of engineer support may require that the units be augmented by teams from the TOE 5–500-series.

c. Since the airborne engineer battalion is well suited to support heliborne operations, it may be used extensively to support other U.S. or receiving state armed forces heliborne operations on a mission basis.

d. When supporting tactical internal defense operations, the airborne engineer company, platoon, and squad may often operate independently of and/or at long distances from their parent unit; therefore, there will be an increased requirement at the lower echelons for independent decisions, initiative, and technical knowledge.

e. Resupply of engineer units may be extremely difficult for those reasons outlined in paragraph 5–39; therefore, units in support of tactical operations should be authorized a special stockage of repair parts, tools, and other expendables as accompanying supplies.

f. Additional liaison and supervisory personnel may be required when subordinate units (companies, platoons, and squads) are widely separated to insure competent support of tactical operations. In internal defense operations, the engineer company or platoon may be supporting small U.S. or RS forces in isolated areas, highly susceptible to insurgent attack. In this case, survival of the unit is paramount and all personnel may be organized into combat elements. No rear echelon is organized; those personnel normally included in the rear echelon may be organized into combat elements to provide CP security, defensive fire support (to include indirect fire), or they may form all or part of the installation reserves. Engineer units operating in this manner may be provided additional crew-served weapons such as the M60 LMG, 60mm mortar, 81mm mortar, and 3.5-inch rocket launcher.

5–44. Advisory Assistance

a. The airborne division engineer battalion may be required to provide advisory assistance to include furnishing specialized mobile training teams (MTT), and training counterpart armed or paramilitary forces in branch or branch immaterial subjects. These operations may include extending USAID, USIA, and other

U.S. civilian programs in the receiving state.

b. The wide range of skills and experience found in engineer units also provides a source of trained personnel which may be used to advise and train civilian governmental personnel. Engineer units may be required to provide part or full-time engineer advisors to civilian agencies at the province, district, city, or village levels.

5–45. Military Civic Action

Military civic action is the use of armed and paramilitary forces on projects useful to the local population at all levels in such fields as education, training, public works, agriculture, transportation, communications, health, sanitation, and others contributing to economic and social development, which would also serve to improve the standing of the armed and paramilitary forces with the population. These operations include extending USAID, USIA, and other U.S. civilian programs in the receiving state.

a. Airborne engineer units can best support that portion of the military civic action program which requires assistance and planning in the construction of utilities, structures, and other similar facilities for use and benefit of the civil population. Engineer units are suited by their organization, equipment, and skills to undertake such tasks; however, the local civilian population must participate in the accomplishment of projects in order to gain knowledge and experience in performing similar tasks in the future. Engineer units are best utilized in support of military civic action by providing teams to advise and assist during the progress of work. Airborne engineer units are capable of supporting the many military civic action missions; however, when technical assistance and construction beyond their capabilities are required, engineer construction units must be employed. (See FM 5–162, FM 31–16, FM 31–73, FM 41–5, FM 41–10, and FM 100–200.)

b. Typical military civic action projects in which engineer units may participate are—

(1) Construction of medical, educational, governmental, religious, recreational, and community facilities.

(2) Rehabilitation and construction of public utilities such as powerplants and water production facilities.

(3) Development and rehabilitation of transportation facilities to include roads, bridges, airfields, and navigable waterways.

(4) Assistance in the development of natural resources such as timber, building material, fuels, and agriculture.

(5) See FM 31–22 and FM 31–22A for additional tasks that may be performed by engineer combat units.

5–46. Psychological Operations

Psychological operations (PSYOP) conducted as part of the overall internal defense program encompass those political, military, economic, and ideological actions planned and conducted to create in neutral or hostile groups the emotions, attitudes, or behavior to support the achievement of national objectives.

a. PSYOP conducted or supported by airborne engineer units must mesh with, and extend receiving state civilian-military information and PSYOP programs.

b. PSYOP in internal defense operations are of the utmost importance. PSYOP can be particularly useful to engineer units engaged in military civic action projects. A PSYOP campaign should be conducted before, during, and after the completion of a project. Requests for PSYOP assistance should be forwarded to higher headquarters. See FM 33–1 for detailed discussion of PSYOP.

5–47. Intelligence Operations

Intelligence plays a vital role in combatting insurgency. Adequate and timely intelligence is most vital to the overall internal defense operation. U.S. military personnel, particularly engineer personnel, are in an excellent position to collect information, from close and frequent contact with the civilian populace. Conversely, U. S. personnel must be careful of loose talk and poor classified material handling procedures lest classified material become compromised. For detailed discussion, procedures, and role of intelligence in internal defense, see the FM 30-series and FM 31–22 and FM 31–22A.

5–48. Internal Security Operations

Internal security operations include supporting U.S. and RS military and civil police in their responsibilities to maintain a state of lawfulness and taking actions to control human and materiel resources, and to deny insurgents access to these resources. Airborne engineer units can support internal security operations by—

a. Providing personnel for mob and riot control in accordance with current regulations.

b. Providing assistance in protecting ports, docks, power stations, waterworks, and other sensitive installations.

c. Providing assistance in establishing checkpoints and border posts.

d. Providing personnel for police-type duty.

e. Supporting border denial operations.

Section X. OTHER OPERATIONS

5–49. Link-Up

Surface link-up with an airhead is generally made by armored forces. The airborne division engineer battalion must assure adequate routes for passage of the link-up force into or through the airhead. This may involve repair of roads, construction or repair of bridges, and clearance of obstacles. If engineer effort is required beyond the limits of the division area, elements of the battalion may be required to move out of the airhead. Such an operation may require infantry support for security of worksites. Engineers may also be required to assist in flank protection for the armored units while they operate in the division area. This flank protection may include construction of barriers or denial operations. The use of atomic demolition munitions in this type of operation is a probability which must be planned for.

5–50. Amphibious Operations

a. The airborne division is not ideally suited for participation in an amphibious assault in an amphibious role without augmentation.

b. The airborne division may participate in an amphibious operation by conducting an airborne assault on one or more inland objectives for subsequent link-up with surface elements. Engineer considerations are the same as for similar operations already described.

5–51. Desert Operations

Successful operations in the desert will require special individual and unit equipment to augment the airborne division engineer battalion TOE. Additional water purification equipment and an increase in the amount of low ground pressure construction equipment normally will be required. Extensive open areas and long range visibility may make achievement of surprise difficult, thereby reducing the time available for assembly and initial organization. For further details see FM 31–25.

5–52. Arctic Operations

If committed in arctic operations, the airborne division engineer battalion will require reinforcement from equipment units and substitution of special vehicles. The requirements for summer and winter are quite different. For example, during winter frozen lakes may provide suitable landing facilities, while in summer construction of such facilities in tundra may require so much engineer effort as to be prohibitive. For further details see FM 31–70, FM 31–71, and FM 31–72.

5–53. Mountain and Jungle Operations

In mountain and jungle operations the airborne division engineer battalion operates as in normal airborne operations. If extensive clearance work is required for airlanding facilities, the battalion will require reinforcement from equipment units. For further details see FM 31–30.

Section XI. COMBAT OPERATIONS

5–54. Introduction

The airborne division engineer battalion or any element thereof engages in combat operations when—

a. The enemy prevents access to the unit's jobsite.

b. The enemy attempts to drive the engineer unit from a jobsite.

c. The enemy prevents delivery of supplies.

d. Enemy action forces sustained ground combat. This may develop in several ways—

(1) The unit commander is forced into a sustained ground combat role to save the unit.

(2) Enemy action forces the unit to fight so that the next higher command might accomplish its mission.

(3) The major commander must commit the engineer unit because of a desperate situation.

5–55. Sustained Combat

When it is necessary to deliberately commit the engineer battalion or any of its elements to a sustained combat role unit integrity should be maintained. The battalion accepts such a mission with a minimum of delay.

a. Responsibility. The major force commander is responsible for the decision to commit engineer units to a sustained ground combat role. He commits the engineer unit only after careful consideration of the restrictions imposed by the loss of engineer support.

b. Situations for Committing Engineer Units in a Sustained Ground Combat Role. There are a number of situations where the major force commander may commit an engineer unit to this role. Some of the more typical situations are—

(1) An overextended defensive front.

(2) A sudden enemy penetration or turning movement.

(3) An enemy airdrop or organized guerrilla activity in a rear area.

c. Type of Mission. The type of combat mission assigned an engineer unit should be based on consideration of limitations in weapons and personnel. The battalion and its companies are armed more lightly and have fewer personnel than comparable airborne infantry units; their infantry combat training is less extensive. Engineer units should be furnished additional fire support, heavy weapons and forward observers, and smaller frontages should be assigned to them than to infantry units.

(1) *Attack type mission.* This type of mission is usually limited to situations which require engineer units to engage bypassed enemy elements in order to get to critical jobsites.

(2) *Defense type mission.* The defense type mission is the one most commonly assigned to airborne engineer units. The major combat force commander should allow enough time for the engineer unit to prepare for the defense so that the proper support can be coordinated and the nonessential personnel and items of equipment can be moved to a rear area. When ample warning time is available to the engineer commander, he prepares his unit for combat in the same way as any other combat force commander.

5–56. Reorganization for Combat

A definite plan must be established which will enable the engineer unit to move efficiently from its normal engineer support role to a combat role. This plan, generally an annex to the unit's SOP, should be established by the battalion and each company. FM 5–135 contains a guide and example annex for reorganization for combat. The plan should provide for the following:

a. Designation of the forward and rear echelons of the command.

(1) *The forward echelon.* The forward echelon will consist of enough sections and units to accomplish the mission. Elements should include—

(*a*) Firepower and maneuvering elements—to fix and destroy or eject the enemy.

(*b*) Communications element—to establish communications between all echelons of the command. Wire should be used when possible.

(*c*) Supply element—to provide the necessary supplies for the mission.

(*d*) Command and control element—to direct the elements in the accomplishment of their mission.

(2) *The rear echelon.* The rear echelon will include all equipment not essential to the sustained ground combat mission. Nonessential vehicles and

heavy equipment are moved to a rear area. Responsibility for the control of the rear area is designated in this section of the SOP.

b. Medical Evacuation. Assignment of aid men, establishment and location of aid stations, and channels of evacuation are covered in this section.

c. Coordination. This section establishes a guide for liaison and coordination between other units of the command, including adjacent combat units and fire support units.

PART THREE

ENGINEER BATTALION, AIRMOBILE DIVISION

CHAPTER 6

INTRODUCTION

Section I. THE AIRMOBILE DIVISION

6–1. Mission

The mission of the airmobile division is to provide reconnaissance and security for larger units, to participate in combat and internal defense/development operations as directed, and to control an area including its population and resources.

6–2. Organization

The airmobile division (fig. 6–1) consists of a relatively fixed command, staff, combat support, and combat service support structure to which are assigned a number of maneuver battalions (airmobile infantry). In organizing the division for combat the division commander groups appropriate elements of the division under its three brigades and other control headquarters in types and numbers appropriate to each control unit's specific mission.

6–3. Capabilities

a. The division is capable of conducting operations in all types of terrain. It is characterized by the ability to respond immediately and to maneuver rapidly over large areas. It can reconnoiter over broad areas, screen wide fronts and extended flanks, act as an effective delaying force, and, on a selective basis, conduct raids in the enemy rear. The division is capable of re-cycling combat forces for immediate use in other areas by vertical entry and recovery of units into and from the battlefield. The division can be introduced into combat so that the mass and intensity of the division attack can be applied promptly against the enemy, thereby changing the tempo of a single engagement, the frequency with which engagements are possible, and the range of terrain over which combat actions can be initiated. The airmobile division can locate and maintain contact with the enemy or maintain contact between other friendly forces, and counter hostile airmobile, airborne, and guerrilla forces. In an unsophisticated or semisophisticated environment, the division can project its influence rapidly by using its firepower and increased mobility to gain and maintain control over land areas.

b. The airmobile division has organic air defense capability in the form of the all arms Redeye missile system.

6–4. Limitations

The airmobile division has the following limitations:

a. Limited ground vehicular mobility.

b. Sensitivity to extremes of adverse weather.

c. Greater dependence upon responsive Air Force air defense, reconnaissance, and close air support than other divisions (except the airborne division).

d. Dependence upon rapid, continuing, logistical support, particularly maintenance and fuel for the division's aircraft.

e. Lack of organic medium and heavy artillery fire support.

f. Limited protection against tanks, artillery, and nuclear effects.

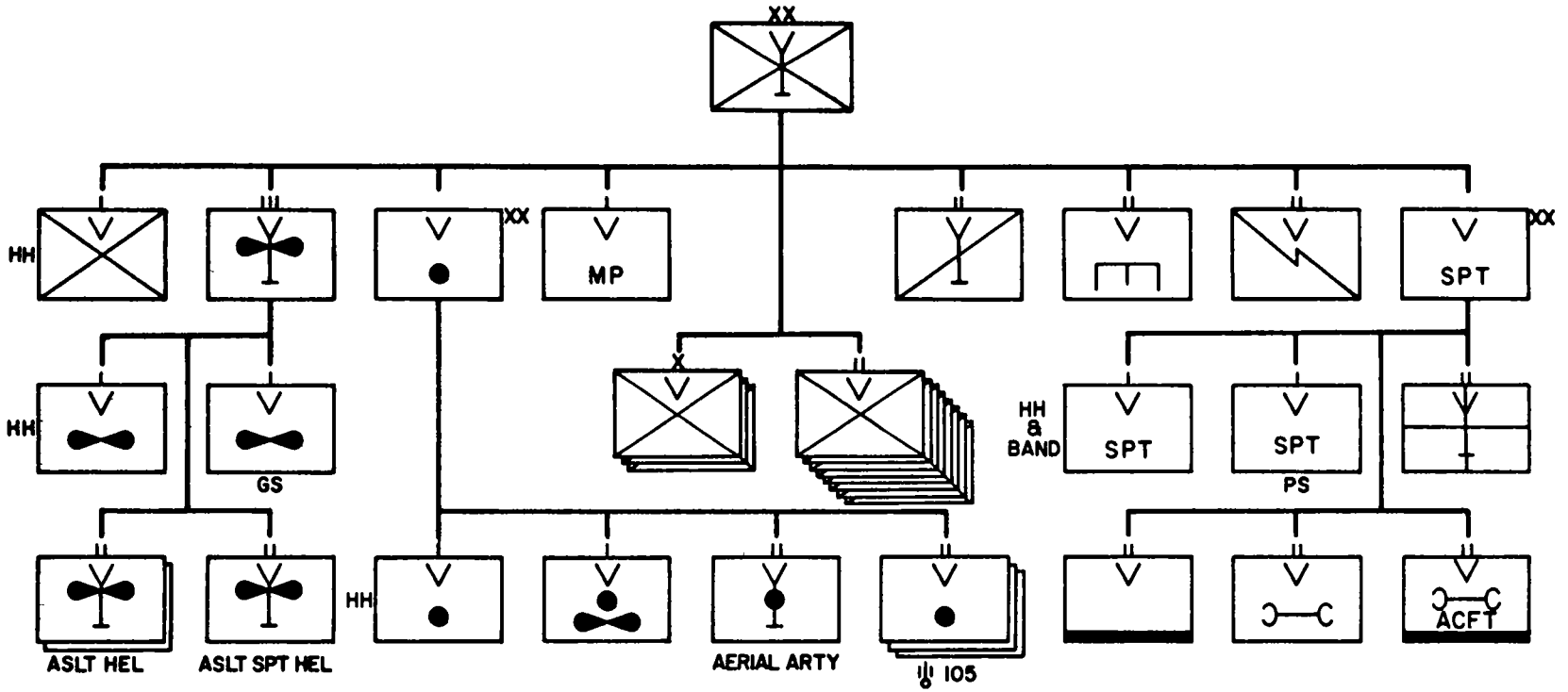


Figure 6–1. Airmobile division organization.

g. Limited capability for sustained ground combat.

6–5. Methods of Operation

a. The airmobile division's capability for aerial movement gives it an area of interest and influence greatly exceeding that of conventional divisions. Effective use of this capability implies wide dispersion of units and greatly increased dependence on mission type orders, standing operating procedures, and radio communications.

b. The airmobile division normally establishes a division base of operations to facilitate control and coordination of the elements necessary to support division operations. As a minimum, the base of operations will contain elements of division artillery, the support command, the aviation group, and an instrumented airfield. Additional facilities and elements that may be located within the area are the division main command post; the division reserve; the division rear echelon; combat support; and combat service support units. Considerations in locating the base of operations include—

(1) Adequate landing and dispersal areas for aircraft.
(2) Adequate internal surface routes.
(3) Defense of the area.
(4) Location of army and corps support elements.
(5) Ability to establish adequate communications for command and control.

c. Brigade bases of operations are established to support and control brigade operations. Facilities included and location considerations are similar to those which pertain to the division base of operations.

Section II. THE AIRMOBILE ENGINEER BATTALION

6–6. Mission

The mission of the engineer battalion, airmobile division, is to increase the combat effectiveness of the airmobile division by performing general and special engineer tasks, and to undertake and carry out infantry missions when required.

6–7. Assignment and Organization

The engineer battalion, airmobile division, is organized under TOE 5–215 and consists of a headquarters and headquarters company, and three combat engineer companies (fig. 6–2).

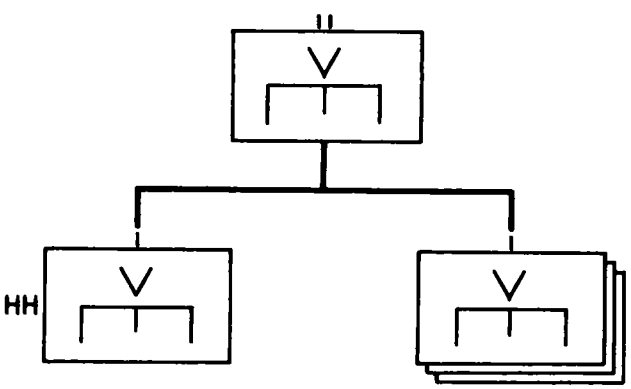


Figure 6–2. Engineer battalion, airmobile division.

6–8. Capabilities

The battalion provides—

a. Engineer staff planning for the division.

b. Supervision of organic and attached engineer units.

c. General engineer support; primarily construction, repair, and maintenance of landing sites for Air Force medium cargo and all army aircraft, and of fords, culverts, and expedient bridging.

d. Assistance in the removal and emplacement of obstacles, including mines and booby-traps.

e. Atomic Demolition Munitions (ADM) support, when required, by attachment of TOE 5–570 ADM teams.

f. Engineer reconnaissance and intelligence service.

g. Personnel and equipment for purification and dispensing of potable water.

h. Assistance in the assault of fortified positions and assault demolition of obstacles.

i. Technical assistance to other troop units of the division in the construction of obstacles, fortifications, barrier emplacement, camouflage, deception devices, and other engineer matters.

j. Infantry combat-type missions when required.

k. The battalion has a limited active air defense capability. Organic weapons (rifles and machineguns) can provide some protection against low-flying aircraft attacking battalion elements. Employment of such weapons in an air defense role should be restricted to retaliatory (self-defense) fires. The techniques contained in FM 23–65, should be used where practicable. Detailed procedures for employment of organic weapons in an air defense role are contained in unit SOP. The active air defense effort must be supported by maximum practical use of passive air defense measures. Practice of passive air defense measures also supports concealment of intent and movement, thereby preserving surprise.

6–9. Limitations

a. During airmobile operations, the battalion is dependent upon support aircraft to move its equipment, supplies, and personnel. Aircraft support must be continuous until conclusion of the mission.

b. Unless furnished additional fire support by artillery, infantry heavy weapons, or armed aircraft units, its capability for sustained infantry combat is limited.

c. The total potable water production capacity of the battalion is 2,500 gallons per hour. In the infantry, mechanized infantry and armored division engineer battalions, this capacity is 7,500 gallons per hour.

6–10. Mobility

The battalion is one hundred percent air transportable. Sectionalization of heavy equipment gives the unit the capability of being transported by organic divisional aircraft.

6–11. Methods of Operation

a. One or more engineer companies may be attached to or placed in direct support of an airmobile infantry brigade for an airmobile assault. The remaining companies are kept under battalion control. Companies attached to brigades revert to battalion control as soon as practicable after the assault, to insure maximum flexibility and economy of effort.

b. Equipment and personnel of headquarters and headquarters company and supporting nondivisional units are employed to reinforce the combat engineer companies as required. These elements may be attached to or placed in support of the combat engineer companies.

c. Improvement or construction of landing areas (drop, extraction, and landing zones) in the objective area during the assault phase of airmobile operations is a responsibility of the battalion The battalion may be reinforced for construction and maintenance of landing zones or other tasks requiring considerable earthmoving. Reinforcement may be by any appropriate type of nondivisional engineer unit capable of being airlanded or airdropped.

d. In internal defense/development operations, elements of the airmobile division engineer battalion may be assigned to political subdivisions such as region, provinces, districts, or villages on an area or task basis.

CHAPTER 7

HEADQUARTERS AND HEADQUARTERS COMPANY

Section I. ORGANIZATION AND CAPABILITIES

7–1. Organization

Headquarters and headquarters company of the airmobile division engineer battalion is organized under TOE 5–216 and consists of two elements; a battalion headquarters and a headquarters company (fig. 7–1).

a. Battalion Headquarters. The battalion headquarters consists of—

(1) Battalion commander (also division engineer).
(2) Executive officer.
(3) Assistant division engineer.
(4) S1.
(5) S2.
(6) S3.
(7) S4.
(8) Engineer equipment officer.
(9) Surgeon.
(10) Chaplain.
(11) Communications officer.
(12) Sergeant major.

b. Headquarters Company. Headquarters company consists of a company headquarters, a headquarters and headquarters company mess team, three company mess teams, two heavy equipment platoons, one light equipment platoon, and personnel to man the following battalion headquarters sections:

(1) Administration.
(2) Operations.
(3) Intelligence.
(4) Communications.
(5) Division engineer.
(6) Supply.
(7) Maintenance.
(8) Medical.

7–2. Capabilities

The headquarters and headquarters company has the capability of providing—

a. Staff planning and supervision of engineer operations within the division, including that required for the operations of attached engineer troops.

b. Engineer reconnaissance and intelligence service.

c. Operation of the battalion communications system.

d. Five water purification and distribution points for the supply of potable water.

e. Atomic demolitions munitions (ADM) support, when required, by attachment of TOE 5–570 ADM teams.

f. Unit level medical service to include medical care and evacuation for the battalion, establishing an aid station, and furnishing aidmen to battalion units.

g. Engineer equipment support for the combat engineer companies.

h. One mess team for each combat engineer company required to operate outside the battalion headquarters area.

i. Staff planning for, and command of, the engineer battalion when employed on an infantry-type mission.

j. By sectionalizing heavy equipment all items in the battalion can be transported by Army helicopters.

7–3. Mobility

The company is one hundred percent air transportable and one hundred percent mobile in organic vehicles.

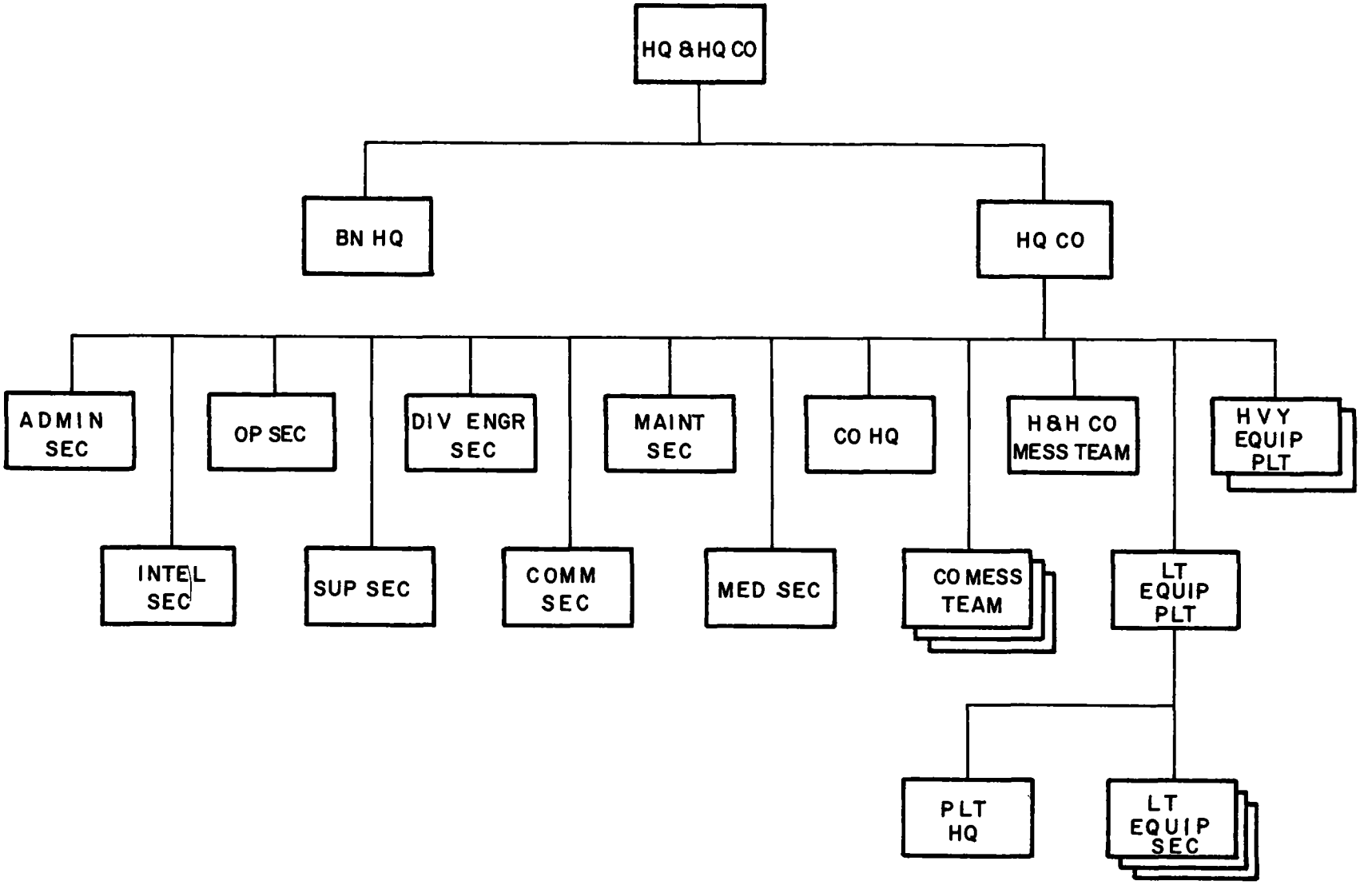


Figure 7–1. Headquarters and headquarters company.

Section II. METHODS OF OPERATION

7–4. Battalion Headquarters

a. The battalion commander has two roles. He is both the commanding officer of the engineer battalion of the airmobile division, and also the division engineer on the division special staff.

b. The duties of the commanding officer and his staff and the functions of the staff sections of the battalion are as discussed in FM 5–1, FM 8–15, FM 33–1, FM 41–10, FM 101–5, AR 600–20, AR 611–101, AR 611–112, and AR 611–201.

c. Conforming to the policies and desires of the division commander and the division engineer the assistant division engineer (ADE) relieves the division engineer of many routine duties at division headquarters. The ADE supervises the functions of the division engineer section which is located within the division headquarters. The division engineer section also furnishes the engineer element to the division tactical operations center (DTOC).

7–5. Headquarters Company

This unit contains virtually all of the construction equipment and combat service support elements of the battalion. Therefore it becomes involved in all missions and tasks assigned to the battalion. This requires the company commander and his key personnel to maintain close liaison with the staff sections and supported elements. Elements of the company, such as mess teams, water purification teams, medical aidmen, and various groupings of construction equipment and operators, may be attached to or placed in support of any of the battalion's line companies. Allocation of the company's resources is made by the battalion commander on the recommendation of the battalion staff and the headquarters company commander.

Section III. THE EQUIPMENT PLATOONS

7–6. Organization and Equipment

Two heavy equipment platoons and one light equipment platoon are organized as part of headquarters and headquarters company. The two heavy equipment platoons have no suborganization, being composed of individual pieces of equipment and their operators. Equipment available in these two platoons includes compaction equipment, wheel-mounted cranes, graders, scrapers, scoop loaders, wheeled and full-tracked tractors, and 2½-ton dump trucks. The light equipment platoon is composed of three subordinate sections and has available electric tool sets, generators, grass cutters, light compaction equipment, helicopter-transportable full-tracked tractors, wheel-mounted backhoe-front loader combinations and one cubic yard dump trucks. See figures 7–2 through 7–5 for specialized items of equipment developed for or adapted to airmobile operations.

7–7. Capabilities

Capabilities of the equipment platoons include—

a. Providing engineer construction equipment and operators to the engineer companies.

b. Providing technical assistance and advice to the supported units on the use and capabilities of the equipment.

c. Assisting headquarters and headquarters company in planning and directing employment of platoon equipment.

d. Supervising the movement of platoon equipment to and from jobsites.

e. Providing 2-shift operation with earthmoving equipment in the platoons. This will normally take the form of two 10-hour work shifts and 4 hours of maintenance in each 24-hour period.

f. By sectionalizing the heavy equipment all pieces of equipment can be transported by Army helicopters.

7–8. Employment

All construction equipment within the battalion, except for chain saws, tool sets, and one cubic yard dump trucks, is concentrated in the equipment platoons. Based on recommendations of the S3, the battalion commander

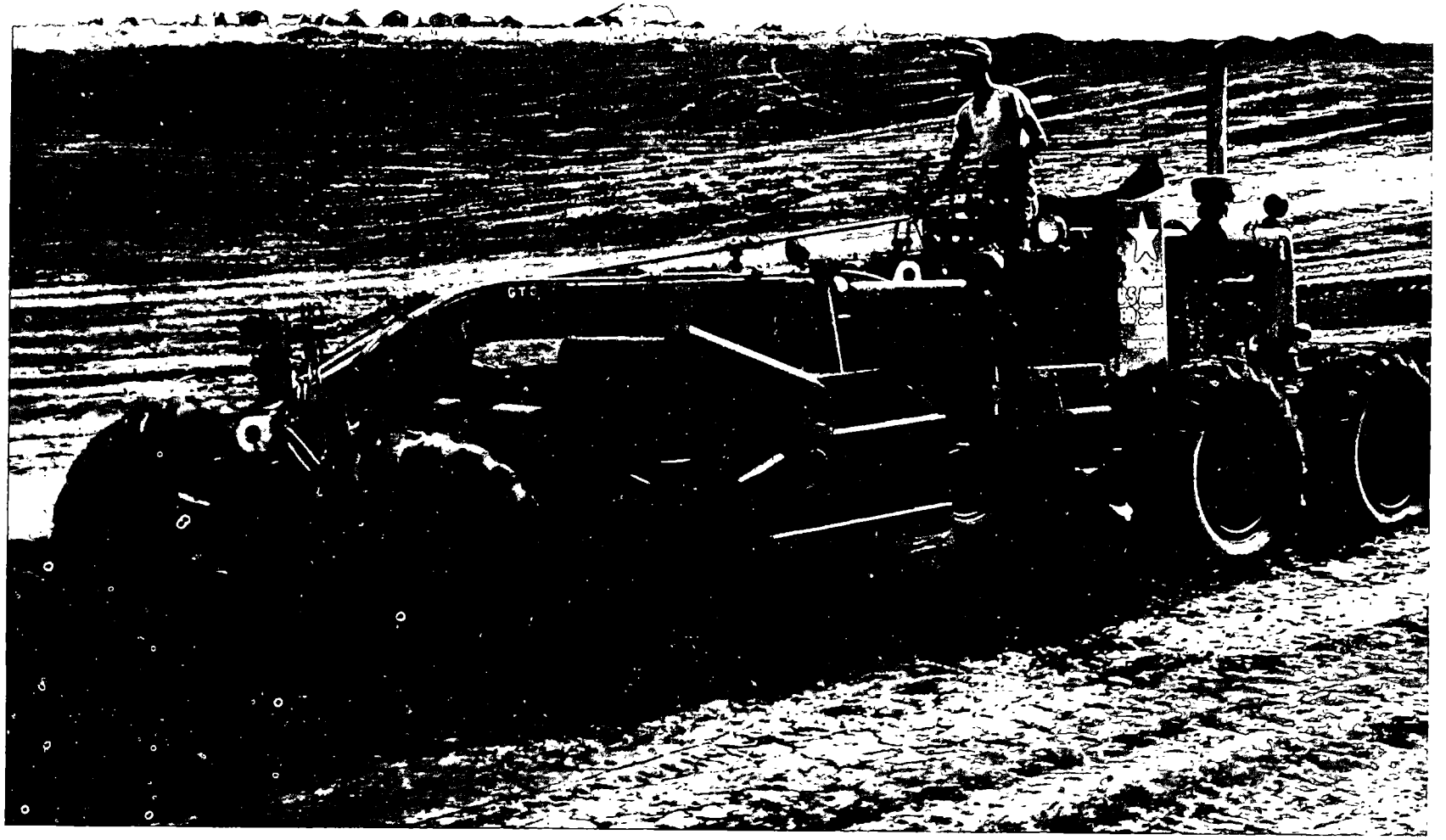


Figure 7–2. Sectionalized grader and grader/scraper in operation.

Figure 7–3. 3-Ton crane.

Figure 7–4. Helicopter transportable tractor towing single-drum sheepsfoot roller.

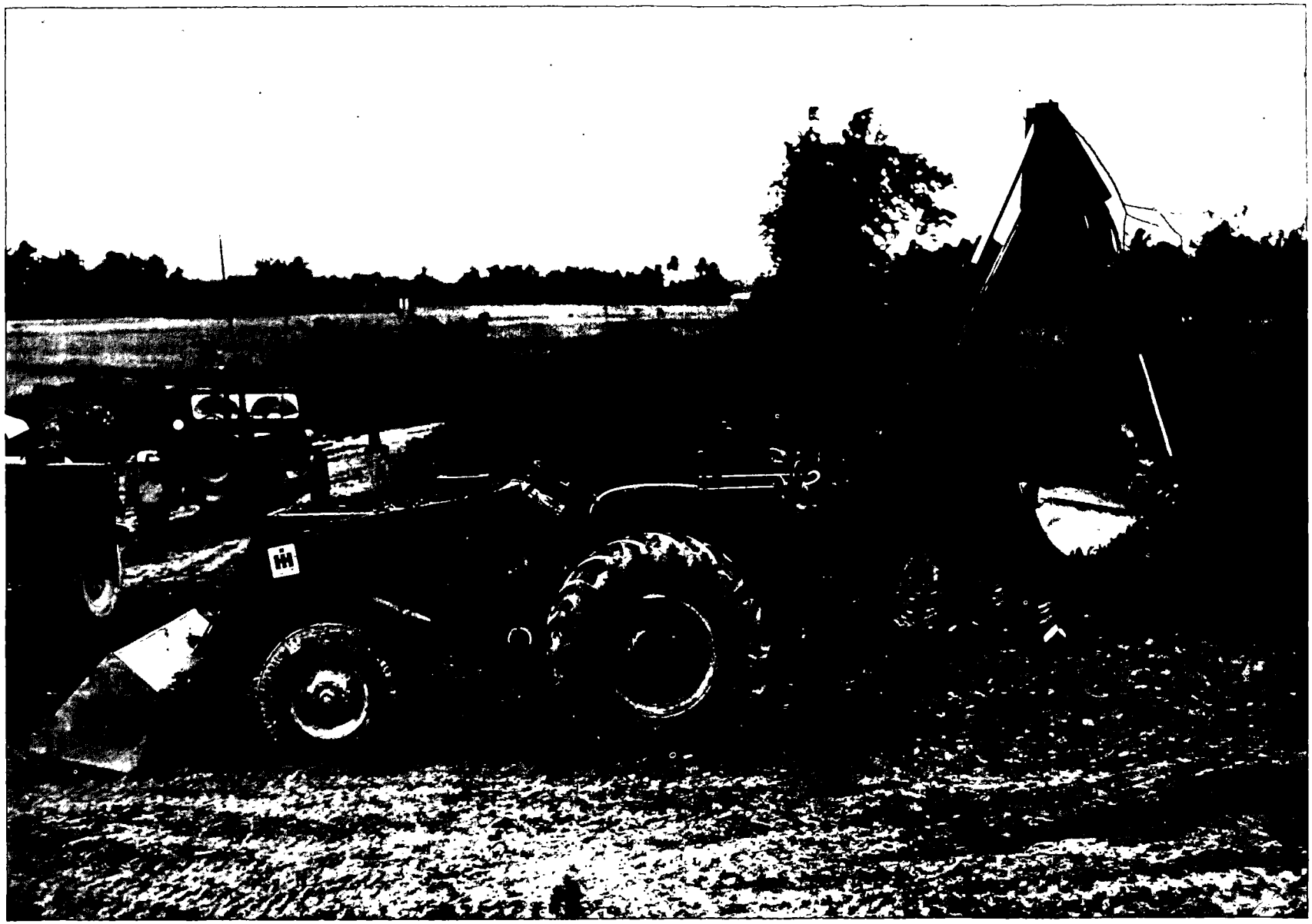


Figure 7–5. Helicopter transportable tractor with backhoe and ½ cubic yard front loader.

Figure 7–6. Dump truck, 1 cubic yard capacity.

allocates platoons, sections, or separate pieces of equipment and operators to subordinate units. Whenever possible such allocation will be made as a complete platoon, section, or element drawn from a single platoon, and will include supervisors drawn from the parent platoon. Elements so allocated will normally be either attached to or placed under the operational control of one of the combat engineer companies for the performance of a specific mission. Upon completion of the mission they revert to control of the headquarters company.

CHAPTER 8

THE COMBAT ENGINEER COMPANY

8–1. Mission

The mission of the combat engineer company, engineer battalion, airmobile division is to—

a. Provide combat support for the airmobile division by accomplishing general and special engineer tasks.

b. Undertake and carry out infantry combat missions when required.

8–2. Organization

The combat engineer company consists of a company headquarters and three identical engineer platoons. Each platoon consists of a platoon headquarters and three identical engineer squads (fig. 8–1).

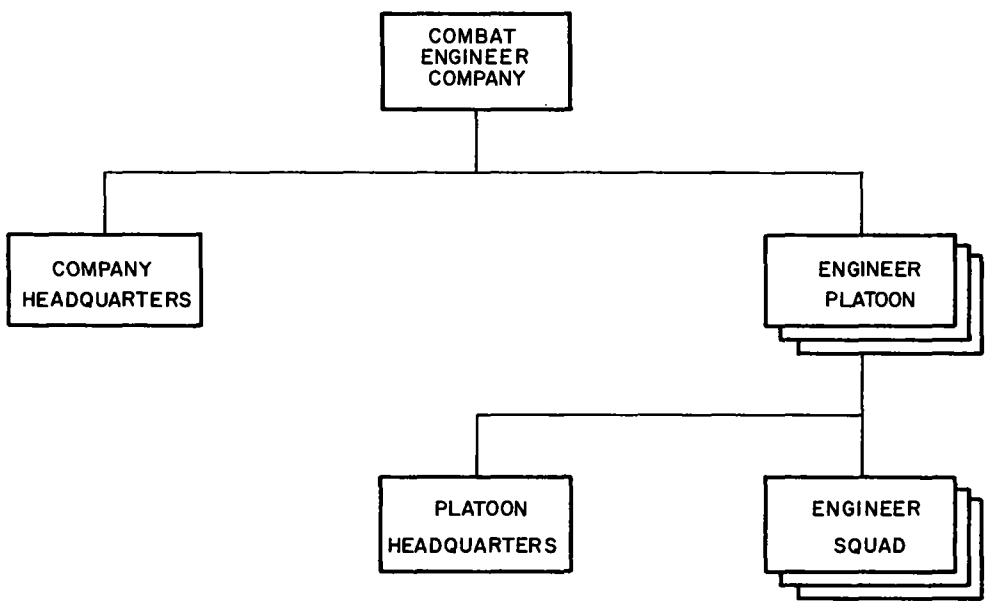


Figure 8–1. Combat engineer company.

8–3. Capabilities

The combat engineer company has the following capabilities:

a. Staff planning and execution of combat engineer tasks in support of a brigade or similar size task force.

b. Establishing roadblocks and barriers by emplacement of obstacles, including HE, chemical, and flame mines and expedients, and boobytraps, and demolition of bridges and structures.

c. Constructing airlanding facilities for Air Force medium cargo and all Army aircraft with equipment support from headquarters company.

d. Making expedient bridge repairs.

e. Destroying equipment, supplies, structures, and material by burning or demolition.

f. Conducting airmobile infantry combat operations.

g. Conducting engineer reconnaissance and intelligence missions.

8–4. Limitations

The combat engineer company is dependent on the headquarters company or other engineer units supporting the battalion for construction equipment support. It is also dependent on divisional aviation units for airmobility. Mess support must be provided by battalion headquarters company.

8–5. Mobility

The combat engineer company is one hundred percent air transportable.

8–6. Methods of Operation

The company carries out missions such as task force assignments as directed by the battalion commander. It often is reinforced with construction equipment and operators from the equipment platoons of headquarters and headquarters company in order to accomplish certain specific tasks. Because of the range of operations and the responsiveness required for speed, mobility, and surprise the company normally will be attached to the supported unit for combat operations. During attachment, specific missions or task assignments for the engineer company are directed by the supported unit commander based upon the tactical plan and recommendations of the engineer company commander acting in the role of unit engineer. Where the tactical situation permits effective control of the company by the engineer battalion headquarters, the company is placed in direct support of the supported unit. Normally, an engineer company is not attached or placed in direct support of a reserve brigade, but performs general engineer work in support of the division until the reserve brigade is committed.

8–7. The Engineer Platoon

The platoon usually is employed as part of a company. However, for specific short duration missions, the platoon may be attached to an airmobile infantry battalion or task force of comparable size. In the latter circumstance, the engineer platoon leader becomes the engineer staff officer for the supported task force and advises the commander on the employment of the engineer platoon. To insure the most effective and economical use of the division's engineer effort, attached platoons should be returned to engineer company control as soon as practicable.

8–8. The Engineer Squad

Because of the limited capability of the engineer squad, it is employed normally as part of its parent platoon. When the squad is attached to a small task force, or when platoon jobsites are widely dispersed, it may be given an independent mission. A typical independent mission would be squad support of an infantry company conducting a raid. In this case, attachment to the supported unit would be required. The squad, however, is most effective when working with the platoon as close control and support of its efforts are thereby assured.

CHAPTER 9

COMBAT AND COMBAT SUPPORT ROLES, MISSIONS, AND FUNCTIONS

Section I. COMBAT ROLES

9–1. General

General information on engineer employment is found in the FM 100- and FM 101-series. These roles are expanded and explained in FM 5–1 and FM 5–135. This chapter discusses the roles and missions of the airmobile divisional engineer battalion as they compare with other divisional engineer battalions.

9–2. Combat Roles

Engineer units participate in all forms of land combat including advance, attack, pursuit, defense, and retrograde operations. The dispersed nature and fluidity of airmobile operations is such that elements of the airmobile engineer battalion probably will engage in small unit infantry type roles more frequently than other types of divisional engineer battalions. The engineer battalion may be required to build airlanding facilities and to fight to protect working parties at the site. It also may have to defend the site against enemy counterattacks.

9–3. Combat Capabilities

Recognizing the increased combat role of the airmobile engineer battalion, squads are provided with additional light machineguns for enhanced firepower. The engineer squad is designed to provide two fire teams, plus a driver for transportation of the squad's equipment.

9–4. Combat Limitations

An engineer unit has less combat effectiveness than an infantry unit of similar size because it has fewer supporting infantry weapons and its infantry combat training is not as extensive. To compensate for these disadvantages, an engineer unit is assigned a smaller frontage than an infantry unit of corresponding size. Additional fire support, such as mortars and artillery, must be furnished by the force commander.

9–5. Reorganization for Combat

a. When assigned a combat role or when the engineer mission may require fighting, the normal battalion organization is changed to provide more effective use and control of crew-served weapons, security of equipment not needed for combat, and for the special requirements of command, communications, and supply in combat.

b. The extent of modification for combat varies with the size of the unit, the time available, and the mission. Reorganization normally consists of dividing the unit into a forward echelon, composed of the personnel and equipment to accomplish the combat mission, and a rear echelon that includes all of the equipment and personnel not directly essential to the the mission.

Section II. COMBAT SUPPORT MISSIONS

9–6. General

a. The primary mission of the battalion is to provide combat support to the airmobile division. In some circumstances, such as development of a base of operations in an internal defense/development environment, the

battalion may be called upon to perform combat service support missions. Normally, such missions will be of the same general type as the more common combat support missions. They will not be considered separately in this manual.

b. Typical combat support missions for the airmobile division engineer battalion include the following:

(1) Construction and maintenance of forward and battle area airlanding facilities for Air Force medium cargo and all Army aircraft.
(2) Construction of obstacles and barrier systems.
(3) Breaching of barriers.
(4) Bridging.
(5) Construction and maintenance of roads.
(6) General construction.
(7) Employment of atomic demolition munitions (ADM).
(8) Water supply.
(9) Technical assistance in camouflage and deception operations.
(10) CBR decontamination assistance.
(11) Technical assistance to other division units.

9–7. Airlanding Facilities

a. The key to the success of airmobile operations may often be the ability of the engineer battalion to rapidly construct or improve airlanding sites. Planning for a forward airfield will provide for early entry of a security force and a pathfinder element for air traffic control. When required, an engineer unit will be introduced along with the above elements to make improvements to the landing area.

b. In tactical operations, initial airlanding facilities will be minimal pioneer type which can be constructed in a short period of time. Usually, this is accomplished by engineers who land in the area in assault helicopters together with necessary equipment support. Initial construction activities usually are limited to clearing trees and other obstacles affecting landing approach, leveling, clearing of ground obstacles and debris, and improving the bearing surface. Under certain climatic conditions dust palliatives, metal landing mats, or membrance surfacing materials will be required. The construction of airlanding facilities is discussed in appendix B and in TM 5–330, TM 5–366. TB 5–330–2 will provide additional guidance on heliport construction.

c. The large number of aircraft organic to or supporting the airmobile division require great quantities of aviation fuel, oil, and lubricants. Storage areas must be at or near the landing sites. Each refueling area for aircraft will also provide resupply of Class V items, as well as maintenance of aircraft, radios, and armament. Engineer effort will be required at these points for site clearing and leveling. Construction performed is the minimum necessary to accomplish the mission.

9–8. Obstacles and Barriers

a. The engineer role in the creation and exploitation of obstacle and barriers will increase in airmobile division operations, particularly in the defense. The lack or armor and other ground vehicles increases the difficulty of conducting defensive operations and causes a greater reliance on the improvement of natural obstacles and the construction of artificial barriers.

b. In the offense, combat elements of the division may land behind a retreating enemy to disrupt the withdrawal of units by placing obstacles, demolitions, and mines along routes of withdrawal. Engineer troops will be required to assist in the creation of obstacles and in the improvement of natural obstacles to help cut off enemy forces so that they can be defeated in detail.

9–9. Destruction, Breaching, and Passage of Obstacles

a. Airmobile operations are characterized by great speed and surprise. They are usually relatively independent of terrain influences such as obstacles that restrict surface operations. The engineer role of obstacle removal in combat should decrease in airmobile operations.

b. Before any operation begins, an engineer study of the terrain, bridges, routes of communication, and obstacles should be made. The most profitable source of information is ground

reconnaissance, but many airmobile operational areas will be beyond reach of ground patrols; therefore, considerable reliance must be placed on aerial reconnaissance and photographs.

c. The engineer unit commander should advise the force commander on how best to overcome any obstacles encountered. The engineer effort available to the force should be directed toward rapid construction and maintenance of selected routes into and through existing gaps and defiles. If bypassing is not possible, the obstacle must be breached or bridged.

9–10. Bridging

a. Although the airmobile divisional engineer battalion has no organic bridging capability, personnel of the battalion are trained in the assembly of both fixed and floating bridges. When supplemented by engineer bridge companies from either corps or army, the battalion is capable of erecting bridging required by the divison's mission. The battalion is capable of designing and constructing timber trestle bridges from native materials with no additional support.

b. The airmobile division normally will fly over river lines and other obstacles requiring bridges. This will decrease the requirement for bridge construction in this type unit.

c. The airmobile division is especially suited to internal defense/development operations. Engineer bridging functions in internal defense/development operations generally are characterized by pioneer type tasks accomplished with native materials and limited equipment. To fulfill his role in this type of an operation the engineer must be thoroughly familiar with all types of stream-crossing expedients, such as bamboo rafts, suspended walkways used in mountains, hand-operated ferries, and suspension bridges.

9–11. Construction and Maintenance of Roads

Construction and maintenance of roads in airmobile operations normally will be limited to those required within the division and brigade bases of operation. New roads usually will be limited to pioneer types requiring minimum construction effort. The divisional engineer battalion should be relieved of its airfield and route maintenance responsibilities by corps or army troops as soon as possible so that it may concentrate on assistance to the combat elements of the division.

9–12. General Construction

The engineer battalion will be required to accomplish various general construction tasks in support of the division. Accomplishment will depend largely on the equipment, personnel, and time available. Examples are—

a. Clearing of dispersed areas for POL, ammunition, rations, and other supply points.

b. Excavating or clearing for shelter sites and emplacements.

c. Prefabricating and assembling pallets for storage, transportation, and flooring.

d. Constructing airfield control towers and other needed structures.

e. Extracting, processing, and stockpiling available native resources.

9–13. Atomic Demolition Munitions (ADM)

a. The airmobile divisional engineer battalion does not have an organic ADM section for the employment of atomic demolition munitions. It relies on nondivisional sources to provide the necessary ADM teams (TOE 5–570) as the situation requires. The battalion does normal ADM planning and supervises the execution of ADM emplaced by the attached or supporting teams.

b. When their use is authorized ADM may be employed to great advantage in cratering, tree blowdown, creating landslides and other obstacles to ground movement during offensive and defensive operations. Such use can also aid in reducing time, manpower, and logistic support necessary to accomplish barrier and denial missions. (See FM 5–26 for doctrine and employment procedures relative to ADM).

9–14. Water Supply

The airmobile engineer battalion is authorized five water purification sets. It is normal to have four sets in operation and one in reserve. In an airmobile operation, because of the widely scattered area in which the division will operate and the small capacity of the equipment authorized, all five sets may be

committed. Support may be required from corps and army engineer units. On departure for an operation, troops should carry with them full canteens and unit water containers. It may be many hours before water purification equipment can be airlifted to the operation area. Normally, one water point will be established in the division base of operations area under control of the engineer battalion S4 and one in each brigade base area. Within such base areas units draw water from the nearest water point using their own ground transportation. Water distribution to units positioned away from such base areas is the responsibility of the supply and service battalion and is accomplished in conjunction with the delivery of rations. Due to the logistics burden of transporting large quantities of water by air over long distances troops in airmobile operations must be constantly aware of the need for conservation of water and should use potable water only for drinking and cooking. Appendix C contains minimum potability standards for field water supply.

9–15. Camouflage and Deception

In fast moving situations typical of airmobile operations, it is doubtful if time will allow extensive artificial camouflage and deception operations, but as much effort as possible must be made to conceal the individual soldier, unit locations, and dispositions. See FM 5–20 for information on camouflage principles and techniques. At division level the G2 is responsible for the intelligence aspects, and the G3 for supervising the preparation of plans for camouflage and deception operations. The engineer plans and supervises engineer operations pertaining to significant construction tasks in support of camouflage and deception activities and furnishes technical advice on minor construction aspects pertaining to either activity.

9–16. CBR Decontamination Assistance

The engineer battalion may be directed to furnish equipment support to other division units in CBR decontamination operations. When so directed the battalion employs available personnel and equipment to decontaminate specified areas, critical materiel or installations using methods outlined in TM 3–220.

9–17. Technical Assistance to Other Division Units

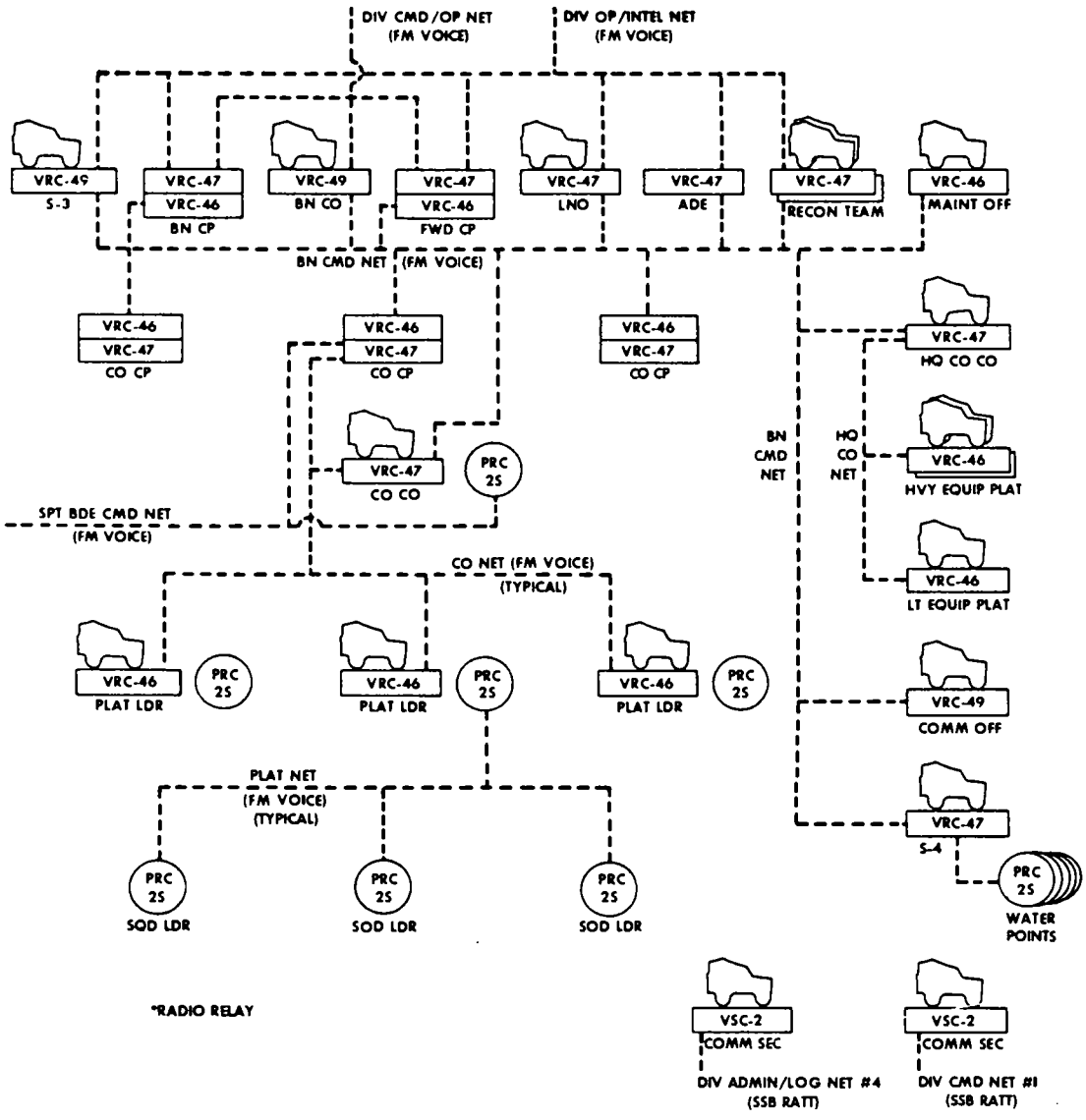
Military engineering, in its broadest sense, includes some pioneering tasks which can be accomplished by the troops of all arms and services. In airmobile operations, the engineer battalion will be required to operate in many widely dispersed locations, frequently taxing its capabilities to the utmost. All units of the division will be required to perform some pioneering tasks which may include site clearing, removal of obstacles, placing obstacles along avenues of approach, or constructing expedient roads and bridges. For example, the engineer battalion is authorized gasoline-driven chain saws and three electric pioneer sets. In an operation where rapid site clearance is essential, engineer soldiers may operate the chain saws while other troops carry away the timber. Training of all units of the airmobile division should stress pioneer construction tasks.

Section III. FUNCTIONS

9–18. Communications

The airmobile engineer battalion uses a combination of radio, wire, visual, sound, and messenger communications to provide as many means of transmitting and receiving messages as conditions permit. Its communications procedures are the same as those of other divisional engineer battalions which are described in FM 5–135. Wire communication is used whenever possible, but the widely dispersed operations of the battalion normally preclude extensive use of wire for communication between its elements. Engineer companies enter the signal system of the brigade or task force they support. Figure 9–1 shows the airmobile engineer battalion's radio net and figure 9–2 its wire net.

a. Communications Section. Under direction of the battalion communications officer, the communications section of headquarters company provides the following services:



NOTE: Pending replacement of the AN/GRR-5 by equipment now under development emergency warnings will be disseminated over existing radio nets in accordance with local SOP.

Figure 9–1. Type battalion radio net.

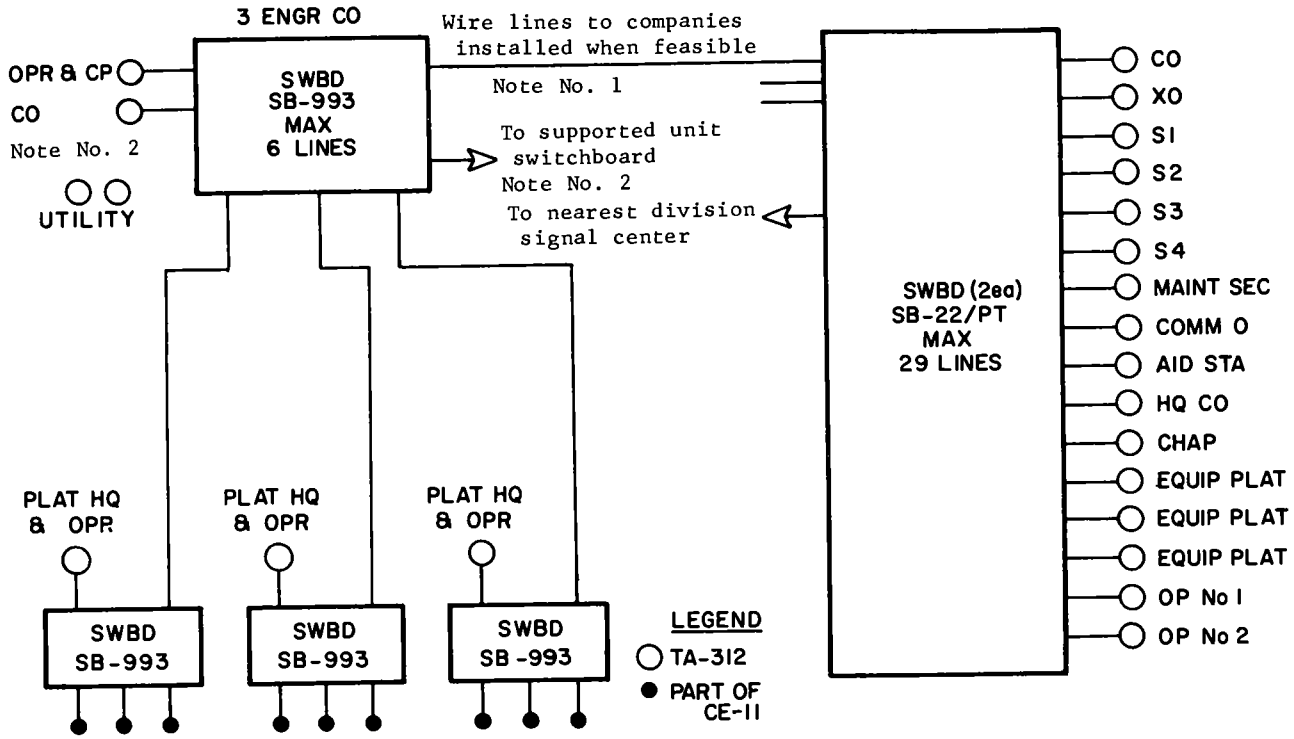
(1) Supervises the operation of the battalion communications system.

(2) Installs wire lines to companies and staff sections when location, time, and the situation permit.

(3) When required, operates the battalion message center and switchboard, and provides messenger service.

(4) Operates panel displays and message pickup facilities.

(5) Provides a stationary FM radio station at the battalion CP and at a forward CP, when required. Normally acts as NCS for the battalion command net (FM voice); operates the engineer battalion station in the division operations/intelligence net (FM voice); and monitors the division command/operations net (FM



Note No. 1: Normal deployment of engineer companies will usually preclude installation of physical wire lines. Telephone communication is normally provided through the division telephone system by tie in to nearest signal center.

Note No. 2: Due to capacity of SB-993 (6 lines), when line is installed to support unit the operators phone is utilized as the CP or CO's phone.

Figure 9-2. Type battalion wire net.

voice) operating for the battalion CO, as directed .

(6) Operates a SSB radio station for the engineer battalion in the division administration/logistics net #4 (SSB RATT) and in the division command net #1 (SSB RATT).

(7) The battalion communications officer operates a radio station in the battalion command net (FM voice) and acts as a relay or retransmission station as required to enhance overall battalion radio communication capability.

(8) Performs organizational maintenance on assigned communications equipment and furnishes maintenance support to other elements of the battalion when required.

(9) Provides facilities for encrypting and decrypting messages.

b. Engineer Company Communications. The company commander is responsible for the efficient functioning of his unit's communications system. Company headquarters personnel perform the following communications tasks:

(1) Supervise operations of the company communications system.

(2) Install wire lines to platoons when time and the situation permit.

(3) Operate the company message center and switchboard.

(4) Operate a stationary station at the company CP. Normally acts as the NCS for the company net (FM voice) and operates the company station in the battalion command net (FM voice). As directed monitors or op-

erates in the appropriate FM net of a supported unit.

c. Aircraft Communications Support. The communications capability of the airmobile division and its subordinate elements is increased greatly by use of organic aircraft as airborne radio relay stations. On occasion, aircraft also can be used for message courier service. Engineer battalion requirements for aircraft communications support should be coordinated through proper channels with the division aviation officer and division signal officer.

9–19. Administration

Combat service support, to include administration, is furnished to the engineer battalion by the division support command. The administrative responsibilities within the battalion are the same as those discussed in FM 5–135. These responsibilities are discharged in accordance with division and battalion SOP.

9–20. Supplies

Supply procedures in the airmobile divisional engineer battalion are generally the same as those for other divisional engineer battalions (FM 5–135). For airmobile operations, however, the following are additional supply considerations:

a. Entry into Objective Area. All units carry operational rations and individual combat meals. Vehicles and equipment are airlifted with fuel tanks filled to a safe level (usually three-fourths full), and additional fuel and lubricants are carried in each vehicle. Units of the assault echelon carry a basic load of ammunition.

b. Construction Supplies and Equipment. There is seldom enough airlift to bring in all desired items. The quantity and types of supplies and equipment are limited by the number and capabilities of the aircraft provided. The fullest use, therefore, must be made of supplies and equipment locally available in the division area of operations, and the engineer intelligence effort is directed toward development of supply sources therein.

c. Delivery. Construction supplies and equipment should be delivered direct to jobsites or to landing or drop zones nearest the using units. Prepackaging of barrier and construction materials facilitates airdrop and airlanding delivery. For example, a prepackaged composite load of fortification material might consist of all mines, pickets, and wire needed for a 70-meter minefield. Prepackaging also aids helicopter or ground movement of supplies from landing zone to the jobsite.

9–21. Maintenance

a. Organizational Maintenance. To take care of the responsibility for organizational maintenance on wheeled vehicles and construction equipment the airmobile engineer battalion has a maintenance section which is a part of the headquarters company. Assigned drivers and equipment operators throughout the battalion perform maintenance on their vehicles and equipment to the extent permitted by their tools and training. In each company, they are assisted by the company motor sergeant, wheeled vehicle mechanic and mechanic's helper. The battalion maintenance section, under control of the maintenance officer, is responsible for organizational maintenance which is beyond the capabilities of the personnel enumerated above.

b. Direct Support Maintenance. The maintenance battalion of the division support command is responsible for direct support maintenance of all equipment within the division except medical and crytographic items. It is also responsible for repair parts supply within the division. Normally, one forward support detachment is placed in support of each brigade and operates within or near the brigade base area. The headquarters and main support company, located in the division base area, supports divisional units in that area. For detailed coverage of direct support maintenance within the division, see FM 9–3.

c. Repair Parts Supply. The engineer battalion maintenance section requisitions repair parts from the maintenance battalion. Basis of requisition is replenishment of the repair parts prescribed load list (PLL).

d. Recovery and Evacuation. Recovery and evacuation of materiel in the airmobile division are accomplished by organic aircraft, with maximum use of back-haul capability of

aircraft returning to the division support area. This includes both items to be repaired and salvage items. In the airmobile division, however, the collection of salvage is accomplished as a low priority service. Salvage collection points are established in the division base area when the support command commander deems necessary. Using units in the brigade areas return equipment for repair to the forward support maintenance detachment. Using units operating in the division support area return reparable equipment to the main support company of the maintenance battalion and salvage to the supply and service battalion unless otherwise directed.

9–22. Transportation

The airmobile engineer battalion's means of surface transport is limited. On occasion, it may be supplemented by usable enemy military and civilian motor vehicles found within the division area of operations.

9–23. Medical Service

Battalion medical service is supervised by the battalion surgeon. Aid men from the battalion medical section support the combat engineer companies as needed. In the event the battalion fights as infantry, the medical section of battalion headquarters company should be reinforced to provide one company aid man per platoon and one senior company aid man per company. Evacuation normally is by division air ambulance; hence, the battalion aid station should be placed as close to airlanding facilities as possible. Evacuation is to the division level medical service which is provided by the support command's medical battalion. Brigades are provided division level medical service by supporting medical companies of the division medical battalion, each of which has an evacuation platoon which may have division air ambulances attached. An engineer company supporting a brigade or task force depends upon the supported unit for division level medical service. Patients may occasionally be evacuated from forward combat areas in nonmedical aircraft returning from supply or other unit support missions.

CHAPTER 10

ENGINEER BATTALION OPERATIONS

Section I. BASIC CONSIDERATIONS

10–1. Employment

a. The engineer battalion of the airmobile division is employed in furtherance of the ground combat effort. The increased mobility of airmobile units and their relative freedom from the restrictions imposed by terrain, as compared to other types of divisions, gives the division engineer more freedom in the construction of obstacles and destruction of bridges to impede the progress of enemy ground operations. The same considerations greatly reduce the necessity for removing obstacles emplaced by the enemy and repairing roads and bridges damaged by enemy action. At the same time, it greatly increases the necessity for rapid repair and construction of all types of airlanding facilities.

b. Engineer support is provided under centralized battalion control when operations permit. Its companies are placed in support of, or attached to, brigades and task forces of the division when employed in coordination with other combat and combat support elements in offensive and defensive operations.

c. The headquarters company contains engineer construction equipment and operators to supplement the combat engineer companies in specific tasks. It also contains mess teams which may be attached to the companies when required.

d. Engineer companies should be placed in support of the same brigades whenever possible to increase operational efficiency. "Normal association" should be established for all possible situations. The company commander acts as the brigade engineer. In this capacity, he provides engineer staff planning and supervises execution of the engineer mission.

e. Attached or supporting engineers should be kept under brigade control when possible. Platoons are placed in support of infantry battalions or task forces only for specific missions. When an engineer platoon is attached to an infantry battalion, the platoon leader acts as the engineer advisor to the infantry battalion commander.

f. Attachment of engineer teams of less than platoon size is sometimes necessary for accomplishment of specific tasks requiring close combat control. In the offensive, this may consist of assault breaching or demolition tasks. In defense or retrograde operations, the execution of barrier demolitions may require mission type attachment. Units of less than platoon size should be returned to the control of the parent unit as soon as practicable after the accomplishment or cancellation of the assigned mission.

g. Airmobile engineer troops engage in limited combat incident to accomplishment of their normal missions. When the situation requires the deliberate commitment of the engineer battalion as infantry, it will be done with division command authority. When so committed, the engineer battalion should receive all available fire support from division artillery and any infantry battalions in the immediate area. Engineers should be committed to infantry-type combat only as a unit.

h. When the requirement for engineer support within the division exceeds the capability of the division engineer battalion, additional engineer support must be provided by the next higher echelon of command.

(1) The additional engineer support to the division may take the form of rein-

forcing the combat engineer strength, the provision of bridging, or the attachment of personnel to perform specialized missions. Usually, however, this support will consist of construction units and equipment for airstrips in the division's operational area. Such support may be critical when there are requirements for landing fields for USAF cargo aircraft.

(2) Nondivisional engineer units normally are placed in support of the division. They may be attached when their missions require close command control in execution. All engineer combat support provided for the division is coordinated by the division engineer.

10–2. Standing Operating Procedures

An SOP is prepared for the battalion and all operating elements (FM 101–5). Details of air movements and loading are included in unit SOP.

10–3. Security

Like all other commanders, the engineer commander is responsible for the security of his unit. Security includes all measures taken to protect a unit against enemy interference, surprise, and observation. The security measures taken by a commander should be appropriate to the threat. Engineer work parties are sometimes protected by infantry elements in order to release more engineer troops for work requiring engineer skills. Detailed procedures for the conduct of local security are contained in FM 7–20 and FM 21–75.

Section II. EMPLOYMENT IN AIRMOBILE OPERATIONS

10–4. Introduction

a. Airmobile operations are plannned to achieve tactical surprise and are completed in the shortest possible time. The airmobile division engineer battalion has been tailored for this type of operation by giving it the capability of entering a combat area by airlanded means and of performing the tasks required in the assault role. The length of time that the battalion can sustain itself is contingent upon the logistical support provided, the weather, terrain, enemy situation, and the extent of engineer effort required for the operation.

b. Based on the scheme of maneuver as announced by the division commander, the division engineer recommends disposition of available engineer troops for all phases of the airmobile operation. He recommends appropriate changes in disposition as the situation develops and the need arises.

c. Combat elements of a force which is to participate in an airmobile operation normally are organized into two echelons. The division engineer should study the tactical plan and recommend the engineer troops required to support the particular mission. Consideration will be given to those items of construction equipment to support each echelon. These echelons consist of—

(1) *Assault echelon.* This element consists of those forces and their equipment that are landed in the objective area to engage in ground combat. Depending on its size and the number and type of aircraft available, it may require one or more lifts.

(2) *Rear echelon.* This element consists of the remainder of the force not immediately needed in the objective area such as administrative personnel and equipment and items that cannot be immediately transported in available aircraft.

10–5. Planning

Planning for an airmobile operation must be simple and flexible. All leaders must be prepared to overcome unforeseen difficulties and exploit opportunities that may arise during the conduct of the operation. To obtain flexibility the planner—

a. Develops simple landing and assembly SOP.

b. Maintains tactical integrity of the unit whenever possible.

c. Makes allowance for operational delays in takeoff and landings.

d. Insures that the success of the operation does not depend on the arrival of any one aircraft.

10–6. Planning Sequence

a. Planning for engineer support of airmobile operations in keyed to the overall tactical plan and scheme of maneuver. Engineer planning develops along the following lines:

(1) The engineer planner first determines how the engineer battalion can best support the ground tactical plan and determine what men and equipment will be required.

(2) He next develops a landing plan to include the timing and phasing of troops and equipment based on the ground tactical plan.

(3) An air movement plan is then developed based on the landing plan and, finally, a loading or marshalling plan based on the air movement plan.

These plans are all closely related and are usually developed concurrently.

b. Besides developing an engineer plan of operation, the division engineer and his staff are responsible for preparing the following annexes to the division operations order.

(1) Barrier annex (FM 31–10).

(2) Engineer annex (FM 101–5).

(3) Atomic Demolition Munitions Plan (as an appendix to division tire support plan, barrier plan, or as a separate plan) (FM 5–26).

10–7. Intelligence

a. The current intelligence situation and intelligence estimates are essential to planning. The battalion S2 develops the battalion intelligence plan, initiates and supervises battalion reconnaissance activities, and requests intelligence data from other agencies. Certain requirements such as terrain intelligence must be given emphasis. Terrain intelligence must cover a large area. The battalion S2 plans and prepares terrain studies and site analyses to support division operations. Support may be obtained from an engineer detachment (terrain) and/or engineer intelligence staffs at army or theater level. An engineer detachment (terrain) occasionally is assigned to corps, and may be attached to an airmobile division to prepare terrain intelligence for any anticipated operation.

(1) A Tactical Commanders Terrain Analysts (TACCTA), designed for airmobile operations, or other terrain analysis, may be prepared for distribution to all major tactical commanders as designated by the G2. This will include data on the following:

(*a*) Landing zones, drop zones, and airfields.

(*b*) Roads, bridges, fords, ferries, and culverts.

(*c*) Weather and climate.

(*d*) Cross-country movement conditions, including data on rivers and streams.

(*e*) Water supply.

(*f*) Obstacles and fortifications.

(*g*) Tactical considerations including cover, concealment, observation, fields of fire, key terrain, and avenues of approach.

(*h*) Construction material.

(2) Special engineering site plans are prepared by the battalion staff as required.

b. The location and selection of adequate and usable landing zones and airlanding facilities may have a vital effect on the tactical plan. The commander of the supported unit is responsible for final selection of airlanding facilities, but he will be assisted and advised on a technical basis by the supporting aviation unit commander and the division engineer. The division engineer will consider carefully the information furnished by engineer reconnaissance, as well as information from pathfinder teams.

10–8. Dissemination of Intelligence Information

Intelligence information should be disseminated to the lowest level and, when feasible, key personnel who take part in the airmobile operation should be given an opportunity to study photographs and maps of the objective area and surrounding terrain. When engineer

units are supporting tactical elements, the engineer unit commander should advise the tactical commander and his staff of all available terrain information and point out conditions which will have an effect on the planned operation.

10–9. Reconnaissance

Reconnaissance is a mission undertaken to obtain, through observation, information about the activities and resources of an enemy or potential enemy, and data concerning the physical characteristics of a particular area. The battalion S2 has two reconnaissance teams, each consisting of an officer and an NCO, to assist him in performing battalion reconnaissance. Uusally, it is not possible to conduct a detailed ground reconnaissance of the objective area. Frequently the commander must rely on aircraft for visual and photo reconnaissance of the objective area. Low oblique photos are particularly helpful. Visual reconnaissance and photo reconnaissance are conducted both before the operation and during the air movement.

Section III. MOVEMENT TO CONTACT AND OFFENSIVE OPERATIONS

10–10. Movement to Contact

a. Once the initial planning phase is completed and the loading and landing plans implemented, the division is prepared to move to contact the enemy. The airmobile force is particularly suited for operation as a covering force of a larger unit during a movement to contact. It reconnoiters from the air on a wide front in advance of the main body. Pathfinder detachments, often assisted by engineer teams, assist in the location as well as the advance preparation of airlanding sites in the objective area.

b. Patrols are airlanded by helicopter to perform ground reconnaissance. When the terrain and the situation permit, visual contact between adjacent patrols is maintained.

c. Units are airlanded by helicopter to perform reconnaissance or to seize terrain. When the terrain and situation permit, visual contact is maintained between adjacent units. During foot movement, flank security forces move by bounds along open flanks and surveillance is maintained to the flanks.

d. Fire support units are displaced forward by air. Supply and evacuation are conducted by air. In this phase of the operation, engineer elements may be widely dispersed, operating with many small groups over a wide area. Communication and control will be difficult. Often a squad leader will be the senior engineer present with a small force. It is imperative that he know the mission of the unit he is supporting as well as the battalion's overall mission.

e. The employment of engineer troops in the movement to contact will differ for each operation. In those operations where it is visualized that the division advance by alternate or successive bounds across a wide front, the engineers that accompany the combat elements must be prepared to fight as infantry, prepare expedient airlanding facilities, clear sites for artillery weapons, remove obstacles, and perform other pioneer engineer tasks.

f. The engineer and his tools should never be separated. When touchdown areas are not available, offloading may be conducted from hovering helicopters. As soon as a site is cleared, tools needed for the mission should be airlanded in helicopters or lowered from them. Since engineer troops in the movement to contact must move rapidly, tools and equipment must be ready at all times for loading into the helicopters.

10–11. Preparation

When orders have been issued to the engineer battalion, the companies that will be attached to committed brigades usually join those brigades in specified out loading areas and prepare for operations with the supported unit. The remainder of the battalion remains with the other elements of the division and prepares personnel and equipment for movement to the division base.

10–12. Assault Phase

a. The assault phase of an airmobile operation begins with the landing of the lead ele-

ments and continues through the seizure of the objective area.

b. The fact that the airlanded force usually lands where there are few fixed defenses and few well organized enemy combat troops facilitates rapid seizure of initial objectives. The enemy is expected to react rapidly. Initial counterattacks are likely to be hasty, uncoordinated thrusts by any of his available units.

c. An airmobile force may attack by infiltration. This method is used in isolated areas where no adequate landing sites exist at or near objectives. Rappeling from hovering helicopters may be required when touchdown areas are not available. Forces are landed in several areas and move cross country to assembly or attack positions to launch a coordinated attack.

d. Engineer elements with the assault forces should be reorganized for a combat role as explained in paragraph 8–5. As soon as possible after arrival at the landing zone, engineer units reorganize in a specified assembly area and establish an assault command post with appropriate communications.

e. Upon assembly in the landing zone, those engineer units with preassigned tasks normally move to their worksites. Work is begun on the preparation of airlanding sites which must be built, improved, or expanded to enable other elements of the division to land. Close coordination with assault infantry elements is maintained at all times.

f. The original plan must provide for delivery of engineer supplies and equipment on the landing zone nearest the worksite. Upon delivery, the supplies and equipment are collected by the engineer troops and either moved to worksites or centrally located for ready access by the using unit.

10–13. Engineer Duties in the Attack

Typical engineer duties in the attack include—

a. Assisting the forward movement of the infantry and supporting arms by repairing roads, constructing expedient bridges, removing obstacles, assisting in locating, marking and removing of mines, constructing airlanding facilities for divisional aircraft, and improving airlanding facilities for assault type cargo aircraft.

b. Providing potable water.

c. Performing general engineer support missions such as camouflage, reconnaissance, barrier planning, and demolitions.

10–14. Pioneer Work by Other Arms

There are seldom enough engineer troops to do all the pioneer work necessary for the advance of the infantry and supporting arms. Assisted by technicians from the supporting engineer companies, (para 9–19) infantry units and supporting elements must help themselves by completing as many pioneer tasks as possible. All combat and combat support troops are trained in the installation and removal of mines.

10–15. Development of the Objective Area

After the force has landed in the objective area, offensive operations follow the principles laid down in FM 57–10, FM 61–100, and FM 100–5. Although capable of conducting operations in the same environments as other divisions, the airmobile division is best suited for those type operations that make maximum use of its ability to overfly obstacles and for those which require rapid mobility, such as—

a. Reconnaissance in force.

b. Envelopment and turning movement.

c. Infiltration.

d. Exploitation and pursuit.

e. Raids.

10–16. Reorganization

When units land directly on, or immediately adjacent to, the initial objective, they reorganize concurrently with or soon after the seizure of the initial objective. When assembly areas are required, they are located within, or adjacent to, landing zones but clear of active landing sites. Reorganization is complete when assault elements of all units are assembled and communication is established.

10–17. Link-Up

a. When withdrawal of an airmobile division from a objective area is not planned or feasible, a link-up operation by a surface force is accomplished. Link-up is planned to insure

that the airmobile force is not subject to defeat in detail. In his planning the engineer must know what type of withdrawal from the objective area is planned. When a link-up with a surface force is planned, the engineer may want heavier equipment delivered to the objective area and to concentrate his effort on roads and bridges along the main avenues of approach of the link-up force.

b. An airmobile force itself is not suited for employment as the surface link-up force. Armored, infantry, and mechanized forces are best suited in this role.

10–18. Liaison

a. Liaison between supporting and supported units is established immediately upon receipt of the operation plan or order, and must be maintained during the attack to assure cooperation and coordination between all units participating in the operation.

b. The assistant division engineer is the chief liaison officer between the airmobile engineer battalion and division headquarters. Similarly, liaison functions between the supporting companies and the brigades are performed by the company commander or his designated agent.

10–19. Summary

The role of the engineer battalion in the attack will differ for each operation. Weather, terrain, area of operation, and enemy situation are among the influencing factors. In all probability, airmobile engineer troops will engage in combat more frequently than engineers of infantry or armored divisions. Lack of tanks and ground mobility means will require that greater reliance be placed on roadblocks, minefields, and similar artificial obstacles. The widely scattered areas of operation will put a serious strain on the limited engineer strength in the division. Support from corps and army engineer battalions often will be required early in an operation to help develop airlanding facilities. Getting engineer equipment and supplies to the worksite will require close coordination and control. Great reliance will be placed upon the initiative of subordinate commanders and unit leaders.

Section IV. THE DEFENSE

10–20. General

a. The organization and defense of a sector of the FEBA is not considered a normal mission for the airmobile division. In the event an airmobile division received this mission, the division would employ a mobile defense posture. The mobile defense is that form of defense in which minimum forces are deployed forward and priority is given to use of mobile combat elements and fires concentrated in the reserve. Primary reliance is placed upon the use of offensive action by the reserve to destroy enemy forces. The airmobile division may also be used as the mobile reserve in a defense conducted by a larger force.

b. Many offensive airmobile operations will include a defensive phase in that, upon landing, the airmobile force must be prepared to counter any enemy reaction. If the airmobile operation involves the retention of the objective area, the unit will enter a defensive phase which may last from a few hours to a few days depending on the mission assigned, the size and composition of the force, enemy reaction, and type of operation contemplated.

10–21. Engineer Support in the Defense

a. The primary combat support missions of the airmobile division engineers in the defense, whether it be a mobile defense or upon landing in the objective area, are to increase the defensive capabilities of combat troops by assisting in the organization of the area to be defended. Engineers may prepare alternate positions; maintain and improve existing roads and bypasses; prepare and maintain air vehicle landing facilities for Air Force medium cargo and Army aircraft; prepare demolitions, lay minefields, blow bridges, and assist in the implementation of the barrier plan.

b. When authorized, ADM may be used to deny specific areas and strengthen the defensive position.

10–22. Barrier Plan

a. The division engineer assists in the formulation of the overall barrier plan and its implementation. Barrier planning, as an integral part of the defensive plan, contributes materially toward gaining time and economizing friendly forces. Barriers delay, limit, disrupt, or canalize enemy forward movement; increase his vulnerability to defensive fires and counteroffensive action; and assist in flank and rear area security.

b. The procedures set forth in paragraph 5–28 as concerns engineer planning and assistance, is also applicable to the airmobile engineer battalion. Details on conduct of barrier operations are contained in FM 31–10.

10–23. Defense Against Chemical, Biological, and Nuclear Attack

a. Normal active and passive defensive measures are employed with emphasis on individual protective measures (FM 3–12 and FM 21–40). Particular stress is placed on the importance of deep foxholes and the provision of overhead cover. The engineer battalion conducts the following tasks in defensive planning for CBR attack:

(1) *For the division.*
- (*a*) Surveys area for suitable shelters and assists in planning and constructing protective facilities for key installations.
- (*b*) Selects alternate water point sites.
- (*c*) Selects and prepares an alternate bridge site for each bridge required.
- (*d*) Assists in the preparation and execution of the division area damage control plan.

(2) *For the battalion.*
- (*a*) Disperses unit personnel, equipment, and supplies consistent with operational practicability.
- (*b*) Organizes unit first aid, rescue, and evacuation teams.
- (*c*) Prepares a CBR defense SOP based on that of the division.

b. In the event of a chemical or nuclear attack, the airmobile division engineer battalion accomplishes the following, as may be appropriate:

(1) *For the division.*
- (*a*) Clearing of exit routes required for evacuation to safe areas.
- (*b*) Construction and posting of signs for unsafe areas.
- (*c*) Firefighting missions.
- (*d*) Clearance of debris from essential routes and airlanding facilities.
- (*e*) Production of maximum amount of potable water.
- (*f*) Such other engineer tasks as are required.

(2) *For the battalion.*
- (*a*) First aid, rescue, and evacuation.
- (*b*) Preparation of personnel and equipment decontamination stations.

10–24. Defense Against Airborne Attack, Guerrilla Action, and Infiltration

The airmobile division engineer battalion must establish, within its area of operation, an observation and warning system and local security which are adequate for defense against enemy airborne, guerrilla, and infiltration tactics. The battalion may be called upon to construct obstacles for the division which would act as a deterrent to the use of such enemy tactics.

10–25. Denial Operations

The most common type of denial operations performed by airmobile forces is the denial of further use of an objective area, to include tunnels and related facilities, on withdrawal of the occupying force. Other than the foregoing exception, participation in denial operations by the airmobile division is in consonance with doctrine established in paragraphs 5–31 through 5–34 and FM 31–10.

Section V. OTHER OPERATIONS

10–26. Night Operations

a. Airmobile forces may be employed effectively at night. They are less vulnerable to enemy ground and air fires, and the enemy has

greater difficulty in determining the location of the main landing than in daylight.

b. Night operations present certain disadvantages and special problems in comparison to daylight operations and require that engineer troops have a higher state of training than for daylight operations. Engineer troops may land with pathfinder units and help establish special aids to navigation to assist in movement and landings.

c. The possibility of using artificial illumination or infrared devices is considered when planning for night operations. Each combat engineer company and the headquarters company is equipped with an emergency airfield illumination set which may be used for this purpose.

d. Engineer units involved in construction tasks may experience great difficulty in operating equipment at night, especially with other troops continually entering the area. If operationally feasible, the engineer commander should seal off the engineer area of operations until all clearing and site preparation has been accomplished. This will expedite the construction mission and avoid confusion and possible injury to friendly troops in the area.

10–27. Retrograde

a. The airmobile division is suitable for use as a covering or delaying force in retrograde operations. Elements of the division with strong engineer support may be landed along main avenues of approach of the enemy and engage the enemy while the engineers prepare roadblocks, obstacles, bridge demolition and minefields to impede the enemy's advance.

b. Airmoble units conduct spoiling attacks or counterattacks when weaknesses develop in the enemy's dispositions. Engineers accompany forces engaged in spoiling attacks and assist in the destruction of enemy dumps, communications, utilities, and water points. If friendly troops plan to reoccupy the area being held by the enemy, it is extremely important to have engineers perform the demolitions during spoiling attacks, because the destruction frequently can be accomplished by destroying a small but critical part of a facility instead of the entire facility. Engineers are trained to know what and how much should be destroyed so that, if rehabilitation subsequently is to be accomplished by friendly troops, it can be accomplished in the shortest possible time. See also FM 5–135.

10–28. Withdrawal by Air

Withdrawal from an objective area may be forced by the enemy or made voluntarily. Advance planning is imperative as the nature of the area of operations, and the limitations of transport aircraft introduce complicating factors not present in other ground operations. The engineer battalion has an important role in withdrawal operation and frequently will be among the last troops to leave an area. Since the engineer units will be engaged in operational missions, the commander should make sure that adequate infantry forces remain in the area to see that sufficient time is allowed for completion of the engineer mission. Some engineer missions might include—

a. Destroying supplies and materials that cannot be evacuated.

b. Executing certain obstacles, i.e., bridge demolitions or the use of atomic demolition munitions, to prevent an enemy advance which would cause delay or interfere with the withdrawal.

c. Providing access routes into departure facilities.

d. Providing the necessary airlanding facilities to accommodate aircraft used for the withdrawal.

Section VI. SPECIAL OPERATIONS

10–29. River Crossing

a. The airmobile division, with its capability to perform vertical envelopment, is especially suited for employment in support of hasty or deliberate river-crossing operations.

b. In executing a hasty river crossing, the river is approached at maximum speed on a broad front. All existing bridges in the zone of advance are objectives. Whether or not bridges are seized intact, hasty crossings are

attempted on a wide front, capitalizing upon airmobile operations, nuclear fires, and improvised means.

c. In support of a deliberate river crossing the airmobile division overflies the water barrier to seize objectives well beyond the far shore from which it can block enemy counterattacks, cut off an enemy retreat, and protect the bridgehead area.

d. In either type river-crossing operation, engineers will be employed with the force to create obstacles, remove demolitions from captured bridges, perform demolition missions including ADM, and to assist in the laying of hasty minefields. The blocking mission is to delay the enemy until friendly forces cross the river and continue the advance. Obstacles created and demolitions performed must not be of the type that will delay the advance or inhibit the maneuver of friendly forces.

10–30. Amphibious Operations

The role of the airmobile division in amphibious operations is similar to that in a deliberate river crossing. The role of the engineer battalion in an amphibious operation will depend on the size of the operation and mission of the division. The division may be a part of an army task force being landed in coordination with the operations of an engineer amphibious support command or it may be a joint operation with Air Force, Navy, and Marine units participating. If the assault is conducted from amphibious assault ships, care must be exercised to insure that embarkation planning covers the orderly assembly of engineer personnel and their equipment. They are assigned ships in a sequence designed to meet the requirements of the landing scheme of maneuvers. Doctrine for amphibious operations is discussed in FM 31–11, FM 31–12, and FM 5–144.

10–31. Desert Operations

Desert operations are discussed in FM 31–25, FM 61–100, and FM 100–5. Successful operations in the desert will require special individual and unit equipment to augment the division engineer battalion TOE. Major engineer roles that will increase in desert operations will include—

a. Increased requirement for water.

b. Increased camouflage requirements.

c. Increased maintenance requirements.

d. Heavier construction equipment may be required.

e. Dust palliatives and portable surfacing material may be required.

10–32. Arctic Operations

If committed in arctic operations, the airmobile division engineer battalion may require augmentation of engineer construction equipment and special vehicles. The requirements for summer and winter seasons are quite different. For example, during winter frozen lakes may provide suitable landing facilities; while in summer construction of such facilities in tundra may require prohibitive engineer effort. Any augmentation of equipment or personnel is based on the anticipated or actual demands of a specific situation.

Section VII. INTERNAL DEFENSE/DEVELOPMENT OPERATIONS

10–33. General

a. The doctrine for employment of the airmobile division engineer battalion in limited and general war, offensive and defensive operations, applies, with significant modification, to internal defense/development situations constituting military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat subversive insurgency.

b. The ultimate objective in combatting insurgency is to eliminate its causes and prevent its recurrence. Engineer combat units may support both tactical and nontactical units conducting operations over vast area, and operational plans must anticipate the difficulties of control of operations and maintenance support. Most important will be the complete integration of engineer operations into the overall consolidation operations campaign (FM 31–22) being conducted in a particular area such as a region, province, district, corps, or division.

This may entail support of U.S. and host country (HC) tactical units in tactical operations, support of HC agencies in internal security operations, assisting HC forces in military/civic action, assisting HC through advisory assistance by providing mobile training teams (MTT) to HC armed forces, paramilitary, or civilian agencies.

c. For a general discussion of engineer units in internal defense/development operations, see FM 31–22. For additional guidance, see FM 31–73, FM 100–5, and FM 100–20.

10–34. The Operational Environment

a. Many factors contribute to making the environment different from that of conventional or nuclear positional warfare. Among these factors are—

(1) The terrain generally is poor for operations.

(2) Forces usually are dispersed over an extremely wide area.

(3) The adversary generally is elusive, hard to identify, highly trained in the techniques of guerrilla warfare, and well motivated.

(4) Sophisticated insurgent paramilitary or armed forces, organized and equipped in battalion or larger size units, may conduct war of movement. See FM 100–5 for discussion of insurgent war of movement.

b. Winning the support of the people is a continuous requirement; in this respect, the application of firepower must be highly selective and restrained when operating among a population whose material and physical well-being must be protected in order not to alienate them from the HC government.

c. Since units usually are dispersed over extremely wide areas, command supervision, to include training, maintenance, and other activities, will be much more difficult.

d. Because of the nature of the terrain and the critical need for numerous construction projects, and the nationwide lack of engineer skills, there will be an especially heavy demand for engineer skills, and knowledge.

e. Small unit commanders frequently will be required to make decisions based on their own judgments, considering the situation at hand, rather than on specific guidance and directions received from higher headquarters. The imagination and initiative of individual engineer commanders will contribute to the effectiveness of the engineer effort in all operations.

f. All engineer commanders are responsible for the security of their commands. In this operational environment, security requirements will be considerably increased, particularly at isolated worksites and during surface movement to and from the worksite. Engineer units may often require protection by other tactical forces to preclude security requirements from hampernig the engineer mission.

(1) All movement is subject to ambush. The organization of convoys and degree of protection required will depend on the actual or potential capabilities of the insurgents in the area through which the convoy will travel. All movements must be treated as tactical moves and appropriate actions taken. Airmobile engineer units must be properly trained in counterambush techniques to insure a high probability of surviving ambushes. See FM 31–16, FM 31–22, and the FM 7-series for detailed discussion of counterambush measures.

(2) An airmobile engineer unit in a static position may require perimeter protection. This can be achieved by using its own troops or by arranging for security forces, from other U.S. or HC armed forces, or HC paramilitary and police units. See FM 31–22 and FM 7-series for defensive measures.

10–35. Mission of Airmobile Engineers in Internal Defense/Development Operations

In addition to supporting the parent airmobile division, the engineer battalion may support U.S. Military Assistance Advisory Group (MAAG), Missions, Military Assistance Commands (MAC), U.S. and/or HC armed forces, HC paramilitary forces, and U.S. and/or HC civilian agencies. Support may entail conducting tactical operations, supporting HC agencies in internal security operations, assisting HC and U.S. forces in military civic action, assisting the HC through advisory as-

sistance by providing MTT to HC armed and paramilitary forces or civilian agencies, or conducting these operations independently as part of the overall operation in a particular area; and, finally, participating in intelligence and psychological warfare operations. Augmentation from the TOE 5–500-, 33–500-, and 41–500-series may be required to provide a greater capability to adequately perform all missions.

10–36. Concept of Operations

Airmobile engineer units may support both tactical and civil elements conducting operations over vast areas. Typically, HC will be critically short of engineering skills, both within the military and the civilian structures. U.S. engineer skills should be applied whenever and wherever they can best augment the HC. Most important will be the complete integration of engineer operations into the overall operations being conducted in a particular area, such as a region province, district, corps, or division.

10–37. Organization

The airmobile division engineer battalion, when committed, usually will maintain its organizational integrity, but may be organized provisionally into task forces, depending upon the particular engineering skills and equipment required. Airmobile engineer units may be attached to or placed in direct support of U.S. units other than the parent division and/or HC tactical forces when the support requirements exceed the capabilities of the other U.S. or HC tactical units' organic engineers. Direct support is desirable since it allows the battalion flexibility in meeting engineer support requirements throughout the operational area; however, since the supported units may often conduct several types and sizes of operations simultaneously, in widely separated locations, attachment may be the most practicable method of employment.

10–38. Tactical Operations

a. The doctrine for employment of airmobile engineer units in limited and general positional warfare offensive and defensive operations applies with modification to internal defense situations. If the insurgency has escalated to include insurgent guerrilla and/or war of movement, operations will include consolidation and strike operations (FM 31–22). Positional warfare tactics and techniques must be modified to fit the special requirements of the operational environment and the nature of the insurgent threat. When supporting tactical operations against insurgent forces, the airmobile division engineer battalion must take advantage of its superior flexibility and mobility.

b. Since airmobile engineer units often will be supporting tactical forces in isolated locations, they may be required to assist in the static defense of the village, outpost, camp, or similar installation in which they are quartered. Airmobile engineer units may also be designated as reserves and required to provide defense of an installation while the installation's main defense force is aiding a similar installation under attack. Type tasks which airmobile engineer troops may perform in support of tactical operations are essentially the same as for positional warfare.

c. The scope of engineer support for tactical operations will be considerably increased, particularly in underdeveloped areas of the world. Engineer units should expect and be prepared to furnish more than the "normal" amount of tactical support and assistance in such fields as water purification, route maintenance, airstrip and helipad construction, bridging, and construction of hasty fortifications and artillery positions. This increased scope of engineer support may require that the units be augmented by teams from the TOE 5–500-series.

d. Since the airmobile engineer battalion is tailored to support heliborne operations, it may be used extensively to support other U.S./HC armed forces heliborne operations on a mission basis.

e. When supporting tactical operations, the airmobile engineer company, platoon, and squad may often operate independently of, and/or at long distances from their parent unit; therefore, there will be an increased requirement at the lower echelons for independent decisions, initiative, and technical knowledge.

f. Resupply of engineer units may be extremely difficult for those reasons outlined in paragraph 10–34; therefore, units in support

of tactical operations should be authorized a special stockage of repair parts, tools, and other expendables as accompanying supplies.

g. Additional liaison and supervisory personnel may be required when subordinate units (companies, platoons, and squads) are widely separated to insure competent support of tactical operations. During the conduct of internal defense/development operations, the engineer company or platoon may be supporting small U.S. or HC forces in isolated areas, highly susceptible to insurgent attack. In this case, survival of the unit is paramount and all personnel may be organized into combat elements. No rear echelon is organized; those personnel normally included in the rear echelon may be organized into combat elements to provide CP security, defensive fire support (to include indirect fire), or they may form all or part of the installation reserves. Engineer units operating in this manner may be provided additional crew-served weapons such as the M60 LMG, 60mm mortar, 81mm mortar, and 3.5" rocket launcher.

10–39. Advisory Assistance

a. The airmobile division engineer battalion may be required to provide advisory assistance to include furnishing specialized mobile training teams (MTT), and training counterpart armed or paramilitary forces in branch or branch immaterial subjects. These operations may include extending U.S. Agency for International Development (USAID), U.S. Information Agency (USIA) and other U.S. civilian programs in the HC.

b. The wide range of skills and experience found in engineer units also provides a source of trained personnel which may be used to advise and train civilian governmental personned. Engineer units may be required to provide part of full-time engineer advisors to civilian agencies at the province, district, city, or village levels.

10–40. Military Civic Action

a. Military civic action is the use of armed and paramilitary forces on projects useful to the local population at all levels in such fields as education, training, public works, agriculture, transportation, communications, health, sanitation, and others contributing to economic and social development, which would also serve to improve the standing of the armed and paramilitary forces with the population. These operations include extending USAID, USIA, and other U.S. civilian programs in the host country (HC).

b. Airmobile engineer units can best support that portion of the military civic action program which requires assistance and planning in the construction of utilities, structures, and other similar facilities for use and benefit of the civil population. Engineer units are suited by their organization, equipment, and skills to undertake such tasks; however, the local civilian population must participate in the accomplishment of projects in order to gain knowledge and experience in performing similar tasks in the future. Engineer units are best utilized in support of military civic action by providing teams to advise and assist during the progress of work. Teams KA and KB, TOE 5–560 are particularly suitable for this purpose. Airmobile engineer units are capable of supporting many military civic action missions; however, when technical assistance and construction beyond their capabilities are required, engineer construction units must be employed. (See FM 5–162, FM 31–16, FM 31–73, FM 41–5, FM 41–10, and FM 100–20.)

c. Typical military civic action projects in which airmobile engineer units may participate are—

(1) Construction of medical, educational, governmental, religious, recreational, and community facilities.

(2) Rehabilitation and construction of public utilities such as powerplants and water production facilities.

(3) Development and rehabilitation of transportation facilities to include roads, bridges, airfields, and navigable waterways.

(4) Assistance in the development of natural resources such as timber, building material, fuels, and agriculture.

(5) Additional tasks that may be performed by airmobile engineer units (FM 31–22).

10–41. Psychological Operations

a. Psychological operations (PSYOP) conducted as part of the overall program encompass those political, military, economic, and ideological actions planned and conducted to create in neutral or hostile groups the emotions, attitudes, or behavior to support the achievement of national objectives. PSYOP conducted or supported by airmobile engineer units must mesh with and extend HC civilian/military information and PSYOP programs.

b. PSYOP in internal defense/development operations are of the utmost importance. PSYOP can be of particular usefulness to engineer units engaged in military civic action projects. A PSYOP campaign should be conducted before, during, and after the completion of a project. Requests for PSYOP assistance should be forwarded to higher headquarters. See FM 33–1 for detailed discussion of PSYOP.

10–42. Intelligence Operations

Adequate and timely intelligence plays an important role in combatting insurgency. U.S. military personnel, particularly engineer personnel, are in an excellent position to collect information from close and frequent contact with the civilian population. Conversely, U.S. personnel must be careful of loose talk and poor classified material handling procedures lest classified material become compromised. For detailed discussion, procedures, and role of intelligence in internal defense/development operations, see the FM 30-series and FM 31–22.

10–43. Internal Security Operations

Internal security operations include supporting U.S. and HC military and civil police in their responsibilities to maintain a state of lawfulness and taking actions to control and protect human and materiel resources, and to deny insurgents access to these resources. Airmobile engineer units can support internal security operations by—

a. Providing personnel for mob and riot control in accordance with current regulations.

b. Providing assistance in protecting ports, docks, power stations, waterworks, and other sensitive installations.

c. Providing assistance in establishing checkpoints and border posts.

d. Providing personnel for police-type duty.

e. Supporting border denial operations.

APPENDIX A

REFERENCES

A–1. Department of the Army Pamphlets (DA PAM)

DA Pam 310-series	Military Publications Indexes.
DA Pam 750–1	Preventive Maintenance Guide for Commanders.

A–2. Army Regulations (AR)

AR 320–5	Dictionary of United States Army Terms.
AR 611–101	Manual of Commissioned Officer Military Occupational Specialties.
AR 611–112	Manual of Warrant Officer Military Occupational Specialties.
AR 611–201	Manual of Enlisted Military Occupational Specialties.

A–3. Supply Bulletins (SB)

SB 5–110	Weight, Cubage, and Transportation Data for Engineer TOE Units.

A–4. Training Circular (TC)

TC 10–1	Field Expedients for Rigging and Outloading Airdrop Equipment.

A–5. Field Manuals (FM)

FM	1–5	Aviation Company.
FM	1–100	Army Aviation, Utilization.
FM	3–10	Employment of Chemical and Biological Agents.
FM	3–12	Operational Aspects of Radiological Defense.
FM	5–1	Engineer Troop Organizations and Operations.
FM	5–13	The Engineer Soldier's Handbook.
FM	5–15	Field Fortifications.
FM	5–20	Camouflage, Basic Principles and Field Camouflage.
FM	5–22	Camouflage Materials.
FM	5–25	Explosives and Demolitions.
FM	5–26	Employment of Atomic Demolition Munitions (ADM).
FM	5–30	Engineer Intelligence.
FM	5–31	Boobytraps.
FM	5–34	Engineer Field Data.
FM	5–35	Engineer's Reference and Logistical Data.
FM	5–36	Route Reconnaissance and Classification.
FM	5–135	Engineer Battalion, Armored, Infantry, and Infantry (Mechanized) Divisions.
FM	5–142	Nondivisional Engineer Combat Units.

FM	7–11	Rifle Company, Infantry, Airborne, and Mechanized.
FM	7–15	Rifle Platoon and Squads, Infantry, Airborne and Mechanized.
FM	7–20	Infantry, Airborne Infantry, and Mechanized Infantry Battalions.
FM	7–24	Communications in Infantry and Airborne Divisions.
FM	7–30	Infantry, Airborne and Mechanized Division Brigades.
FM	8–15	Division Medical Service, Infantry, Airborne, Mechanized, and Armored Divisions.
FM	9–30	Maintenance Battalion, Division Support Command.
FM	10–50	Supply and Transport Battalion, Division Support Command.
FM	11–57	Signal Battalion, Airborne Division.
FM	12–11	Administrative Company, Airborne, Armored, Infantry, and Mechanized Divisions.
FM	17–36	Divisional Armored and Air Cavalry Units.
FM	20–32	Landmine Warfare.
FM	20–33	Combat Flame Operations.
FM	21–13	The Soldier's Guide.
FM	21–30	Military Symbols.
FM	21–40	Chemical, Biological, and Nuclear Defense.
FM	21–48	Chemical, Biological, and Radiological (CBR), and Nuclear Defense Training Exercises.
FM	23–65	Browning Machine Gun, Caliber .50, HB, M2.
FM	24–1	Tactical Communications Doctrine.
FM	24–16	Signal Orders, Records and Reports.
FM	24–18	Field Radio Techniques.
FM	24–19	Communications-Electronics Reference Data.
FM	24–20	Field Wire and Field Cable Techniques.
FM	30–5	Combat Intelligence.
FM	30–10	Terrain Intelligence.
FM	30–16	Technical Intelligence.
FM	31–10	Barriers and Denial Operations.
FM	31–15	Operations Against Irregular Forces.
FM	31–16	Counterguerrilla Operations.
FM	31–22	U.S. Army Counterinsurgency Forces.
FM	31–25	Desert Operations.
FM	31–30	Jungle Training and Operations.
FM	31–50	Combat in Fortified and Built-up Areas.
FM	31–60	River-Crossing Operations.
FM	31–70	Basic Cold Weather Manual.
FM	31–71	Northern Operations.
FM	31–72	Mountain Operations.
FM	54–2	The Division Support Command.
FM	57–10	Army Forces in Joint Airborne Operations.
FM	57–35	Airmobile Operations.
FM	57–38	Pathfinder Operations.
FM	57–100	The Airborne Division.
FM	61–100	The Division.
FM	100–5	Field Service Regulations—Operations.
FM	100–10	Field Service Regulations—Administration.

(C) FM 100–20	Field Service Regulations Stability Operations (Internal Defense and Development) (IDAD) (U).
FM 101–5	Staff Officers' Field Manual; Staff Organization and Procedures.
FM 101–10-series	Staff Officers' Field Manual; Organizational, Technical and Logistical Data.
FM 101–31-series	Staff Officers' Field Manual; Nuclear Weapons Employment.

A–6. Technical Manuals (TM)

TM 3–220	Chemical, Biological, and Radiological (CBR) Decontamination.
TM 5–210	Military Floating Bridge Equipment.
TM 5–270	Cableways, Tramways and Suspension Bridges.
TM 5–312	Military Fixed Bridges.
TM 5–330	Planning, Site Selection, and Design of Roads, Airfields, and Heliports in the Theater of Operations.
TM 5–331	Management: Utilization of Engineer Construction Equipment.
TM 5–335	Drainage Structures, Subgrades, and Base Courses.
TM 5–366	Planning and Design for Rapid Airfield Construction in the Theater of Operations.
TM 5–530	Materials Testing.
TM 5–700	Field Water Supply.
TM 5–725	Rigging.
TM 10–500-series	Manuals covering the airdrop of supplies and equipment; rigging of particular items of equipment.
TM 38–750	Army Equipment Record Procedures.
TM 55–450–8	Air Transport of Supplies and Equipment: External Transport Procedures.
TM 57–210	Air Movement of Troops and Equipment.
TM 57–220	Technical Training of Parachutists.

A–7. Tables of Organization and Equipment (TOE)

TOE 5–25	Engineer Battalion; Airborne Division.
TOE 5–26	Headquarters and Headquarters Company, Engineer Battalion, Airborne Division.
TOE 5–27	Engineer Company, Engineer Battalion, Airborne Division.
TOE 5–215	Engineer Battalion, Airmobile Division.
TOE 5–216	Headquarters and Headquarters Company, Engineer Battalion, Airmobile Division.
TOE 5–217	Combat Engineer Company, Engineer Battalion, Airmobile Division.
TOE 57	Airborne Division.
TOE 67	Airmobile Division.

A–8. Army Training Program (ATP)

ATP 5–25	Engineer Combat Units.

APPENDIX B

AIRLANDING FACILITIES

Section I. INTRODUCTION

B–1. Purpose

This appendix provides information and guidance in the planning, site selection, and engineer support required for construction of airlanding facilities in airborne and airmobile operations.

B–2. Airlanding Facility Construction Missions

a. In airborne and airmobile operations the nature of drop and landing zones is an important consideration in formulating the landing plan and scheme of maneuver. Drop zones and landing zones must provide for an initial disposition of troops which facilitates seizure of assigned objectives. Plans for the construction and improvement of landing areas are predicated on plans for the buildup in the objective area.

b. The divisional engineer battalions in both the airborne and airmobile divisions have the mission of construction and improvement of airlanding facilities for the division. Usually, the facility will be initially a minimal pioneer type that is constructed in a short period of time. Initial construction activities usually are clearance of trees and other obstacles affecting landing approach, leveling, clearance of ground obstacles and debris, drainage, and bearing surface improvement. Engineer construction support required from nondivisional units depends upon the type of work to be done, the schedule of operations, and the criteria of the facilities. Frequently, the divisional battalion is augmented by supporting engineer elements from corps or army. When a pioneer airstrip becomes operational, the divisional engineer battalion may be relieved by supporting units so that it may be free to conduct additional operations in division forward areas.

B–3. Definition of Terms

a. Landing Area. This is the general area used for landing troops and materiel either by airdrop or airlanding. This area includes one or more drop zones or landing zones.

b. Drop Zone. A drop zone is a specified area upon which airborne troops, equipment, and supplies are dropped by parachute, or on which supplies and equipment may be delivered by free fall.

c. Landing Zone. Landing zones are specified zones within an objective area used for the landing of aircraft.

d. Extraction Zone. An extraction zone is a specified site at which supplies and equipment are delivered by extraction from minimum altitude aircraft (para 5–16*e*).

e. Airlanding Facilities. These are the minimum essential facilities which can reasonably be constructed in an airhead to permit the continuous airlanding of aircraft. The term denotes facilities less elaborate than an airfield.

f. Airfield. An airfield is an area prepared for the accommodation, landing, and takeoff of aircraft.

Section II. SITE SELECTION

B–4. Initial Planning

a. Site selection is of paramount importance in planning airlanding facilities. Sites must be capable of rapid improvement to meet criteria imposed by aircraft characteristics, normally with a limited construction capability. The division engineer staff provides technical assistance in selection of specific airlanding facility sites, based on the terrain in the area, and the construction capability of the units available for the mission. Assistance from an engineer terrain intelligence detachment, if available, should be obtained. Highways, sports fields, and other cleared areas which will require minimum clearance and leveling must be carefully considered. Initial planning should include selection of several possible sites for each airlanding facility required. Subsequent ground reconnaissance will determine which of the possible sites is the most suitable for development.

b. Assault airlanding facilities in all division areas must remain in use throughout the operation so that they can:

(1) Accommodate reinforcements and resupply tonnages to insure the operation's continuation.
(2) Provide airlanding flexibility. If part of the facilities are knocked out by enemy action, other operational facilities can be used.
(3) Reduce ground supply movement. Continued use of all airlanding facilities permits aerial delivery of supplies close to using units.

B–5. Number of Airlanding Facilities

a. As many widely dispersed airfields and airlanding facilities as possible should be seized. The number actually required to support division, brigade, and battalion areas varies according to the situation and the following factors:

(1) Size of the force to be supported.
(2) Planned buildup, including the number and type of aircraft to be employed.
(3) Tactical and logistical plans.
(4) Terrain in the objective area.
(5) Enemy capabilities.
(6) Weather during the operations.
(7) Engineer capabilities.
(8) Availability of local civilian resources.

b. The desirable minimum number and type of airlanding facilities for support of both the airborne and airmobile divisions is—

(1) One assault airlanding facility for each committed brigade and one for the division operations base.
(2) One medium transport airlanding facility for the division operations base capable of accommodating Air Force C–130 aircraft.

c. The above minimum does not take into account provision of airlanding facilities to offset losses from enemy action.

d. The airmobile division may require additional dispersed facilities to accommodate the division's organic and attached aircraft.

e. In internal defense/development operations airlanding facilities will frequently be constructed in many areas where operations are anticipated. This technique is required to permit rapid reaction to insurgent actions and aids in deceiving the enemy as to the location of planned combat operations. Under such conditions the minimum number of facilities given in *b* above will be greatly exceeded and the construction of such facilities will represent the major portion of the workload for many engineer units.

B–6. Landing Zones for Assault Aircraft

Existing airfields, certain sections of roads, some beaches, and open areas are suitable for assault landing zones. These sites may require improvements such as filling craters and removing trees from approach zones. Assault landing zones should include sufficient landing area, enough space for aircraft ground movement, and loading and unloading areas.

B–7. Desirable Characteristics

a. Desirable characteristics for landing zones are—

(1) Near objectives.
(2) Located in a position that is easily defensible against ground attack.

(3) Unoccupied by the enemy and free from antiairborne and antiaircraft obstacles and antiaircraft defensive fires.
(4) A straight, unobstructed, approach for aircraft.
(5) Ease of identification, especially during periods of low visibility.
(6) Availability of cover and concealment close to the landing area.
(7) Suitability for improvement and expansion.

b. Desirable characteristics for airlanding facilities are—

(1) Clear approaches to landing strips.
(2) Parking and dispersal areas to accommodate the planned aircraft capacity of the facility.
(3) A road net to and from the facility.
(4) Nearness of suitable assembly areas.
(5) Areas and other accommodations that facilitate supply and evacuation.
(6) Soil and terrain that is favorable to rapid construction and resistant to deterioration caused by usage and weather.

B–8. Tactical Considerations

Success of the mission is the overriding consideration in site selection. In some instances, a technically less desirable site is chosen over another because of tactical considerations. When an operation must have a certain airlanding capability within a specified time in order to succeed, site selection becomes a critical tactical consideration. Commanders of all participating aviation elements, therefore, must share the responsibility for site selection and consider it from the tactical standpoint.

B–9. Engineer Considerations

In site selection, the engineer is interested in the characteristics of the area of operations. Some of the factors he considers are—

a. Terrain in the objective area, with particular emphasis on the following:

(1) Airfields that can be seized intact or rehabilitated.
(2) Superhighways, beaches, or other areas of reasonably well-compacted soil.
(3) Soil characteristics, relief and vegetation.
(4) Extent and nature of obstacles in the landing area.
(5) Terrain studies of each site or area.
(6) Current aerial photographs.
(7) Drainage characteristics and effects of weather on soil conditions.
(8) Condition of the road net.
(9) Existing construction materials and natural materials in the objective area.

b. Time limitations on airlanding facility construction caused by tactical considerations.

c. Means available for delivering construction equipment and supplies to construction sites.

d. Provision of facilities for refueling, servicing and parking aircraft. Dispersion and camouflage of these facilities is also necessary. These construction tasks include leveling, clearance of obstacles, runway final grading and, possibly, surfacing.

Section III. OTHER CONSIDERATIONS

B–10. Criteria

Initial airlanding facilities are established on acceptable minimum criteria based primarily upon operational necessity and aircraft characteristics. A minimum criteria airlanding facility is one which provides the minimum dimensional and bearing capacity requirements for a specific aircraft at a specific landing weight and the anticipated sorties per day. Detailed information on requirements is contained in TM 5–330 and TM 5–366.

B–11. Battalion Capability

Both the airborne and airmobile divisional engineer battalions have a limited capability for construction and improvement of airlanding facilities. This capability is designed to meet the requirements for pioneer facilities in the initial stages of airborne or airmobile operations. Neither battalion has the capability of doing extensive construction work on airlanding facilities and simultaneously providing other types of combat engineering support to

its parent unit. Thus, the requirements for construction of airlanding facilities must be considered together with the requirements for other types of combat engineering support and the divisional engineer battalion may require support by nondivisional units.

B–12. Construction Support

The engineer construction support required will depend upon the type and amount of work to be accomplished, the schedule of operations, and the criteria for the facilities. The Engineer Combat Battalion (Airborne) (TOE 5–195) (when organized) and the Engineer Light Equipment Company, Airborne, (TOE 5–54) are specifically designed to support airborne operations. They are also well suited to supporting airmobile operations. The Engineer Combat Battalion, Army, (TOE 5–35) and the nonairborne version of the Engineer Light Equipment Company (TOE 5–54) may also be used in support of either divisional battalion.

B–13. Soils Trafficability

a. Soils bearing capacity is a prime consideration in construction of airlanding facilities, roads, and other facilities. Since the environment and the situation often will limit the deliberate selection and manipulation of soils bearing capacities, the airborne and airmobile engineers must be able to determine relative soils bearing values. The principal means of accomplishing this in these units is through use of the airfield con penetrometer which is available at platoon level in both battalions. TM 5–366 describes the use of this instrument. TM 5–530 describes more rigorous testing methods which may be used if the situation permits.

B–14. Use of Surfacing Materials

The logistical burden imposed by the use of landing mats for surfacing limits their use. However, in areas where trafficability is generally poor and weather conditions are frequently or periodically very rainy, airfield surfacing will be required, especially to support heavy transport and tactical support aircraft. The use of landing mats remains the best means to meet this requirement. Membrane surfacing has proved very helpful as a means of dust control and to assist in waterproofing *but does not add strength* to the underlying soil. TM 5–366 contains a discussion of both mats and membranes.

APPENDIX C

MINIMUM POTABILITY STANDARDS FOR FIELD WATER SUPPLY

SOLOG AGREEMENT 125
9 SEPTEMBER 1966

UNITED STATES—UNITED KINGDOM—CANADIAN—
AUSTRALIAN ARMIES
NON-MATERIEL STANDARDIZATION PROGRAM

TITLE OF AGREEMENT

MINIMUM POTABILITY STANDARDS
FOR FIELD WATER SUPPLY

DETAILS OF AGREEMENT

1. The Armies of the United States, United Kingdom, Canada, and Australia agree to accept the criteria and standards set forth herein as the minimum potability standard for a safe emergency water supply intended for human consumption under field conditions.

2. Criteria
   a. Short term field water consumption is consumption for 0–7 days.
   b. Long term field water consumption is consumption for periods in excess of seven days.
   c. Total daily consumption per man is considered to be 5 liters (app 1 imperial gallon or 5 US quarts). Under environmental conditions where water consumption substantially exceeds 5 liters per day, the tolerance levels should be proportionately reduced by the commander upon recommendation of his surgeon.
   d. At the individual level the only standards that can be applied are the bacteriological standard and the short term physical standard.
   e. At the unit level short term standards only can be applied.
   f. At Brigade, Combat Group or equivalent and rearward levels the short term standards apply for 0–7 days. Beyond this time frame, the long term standards apply.
   g. Where one of the Armies is unable to meet the standards prescribed herein, the other Armies participating in the agreement will be notified.

3. Source

The water supply shall be obtained from the best available source and shall be rendered safe by acceptable treatment methods.

4. Bacteriological Standards

a. Coliform Count

The most probable number of the coliform group of bacteria shall be less than 1.0 per 100 ml of water. (Short and long term.)

b. Analysis

The method and analysis for coliform bacteria shall be that customary for the cognizant nation.

c. Pollution

The presence of the coliform bacteria, including all organisms of the Coli-Aerogenes Group, shall be considered as indicating water pollution, other than BW Agents.

5. Physical Standards

a. Turbidity

For short term consumption water shall be reasonably clear. For long term consumption, the turbidity of water shall not exceed 5.0 mgms per liter (silica scale).

b. Taste and Odor

For short term consumption, water should be reasonably free from taste or odor due to hydrogen sulphide, phenols, or other chemical substances.

For long term consumption, water should be free from taste or odor due to such substances both before and after disinfection.

6. Chemical Standards

The methods of analysis for the following substances shall be as specified by cognizant nation.

a. Substances for which water must be analyzed as a routine requirement.

(1) Short Term Standards

The maximum limits listed below are mandatory for emergency water supply for a period not exceeding seven days. (Asterisked standards are interim pending completion of more exacting studies.)

Arsenic (As)	2.0	mgm/1
Cyanides (incl Cyanogen Chloride)	20.0	mgm/1
Mustard (Sulphur & Nitrogen)	2.0	mgm/1*

Nerve Gas G (A)	0.1	mgm/1*
(B)	0.05	mgm/1*
Nerve Gas (Vx)	0.005	mgm/1*

(2) Long Term Standards

The limits listed below are preferable in water to be used continuously in excess of seven days. (Asterisked standards are interim completion of more exacting studies.)

Arsenic	0.2		mgm/1
Cyanides (incl Cyanogen Chloride)	2.0		mgm/1
Mustard (Sulphur & Nitrogen)	2.0		mgm/1*
Nerve Gas G (A)	0.1		mgm/1*
G (B)	0.05		mgm/1*
Nerve Gas (Vx)	0.005		mgm/1*
Chloride (Cl)	600.0	or	mgm/1
Magnesium (Mg)	150.0		mgm/1
Sulphates (SO_4)	400.0		mgm/1
Color	50		units
Total Solids	1500.0		mgm/1

7. Radiological Standards (Gross Fission Products)

a. For short term consumption, no absolute numerical standard is recommended or considered necessary. This is based on the conclusion that, if the external radiation hazard permits occupancy of the water point, the water is suitable for consumption during occupancy not exceeding the one-week period.

b. For long term consumption, available information does not permit the establishment of a practical standard.

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